AVIATION WEEK

FEB. 16, 1953

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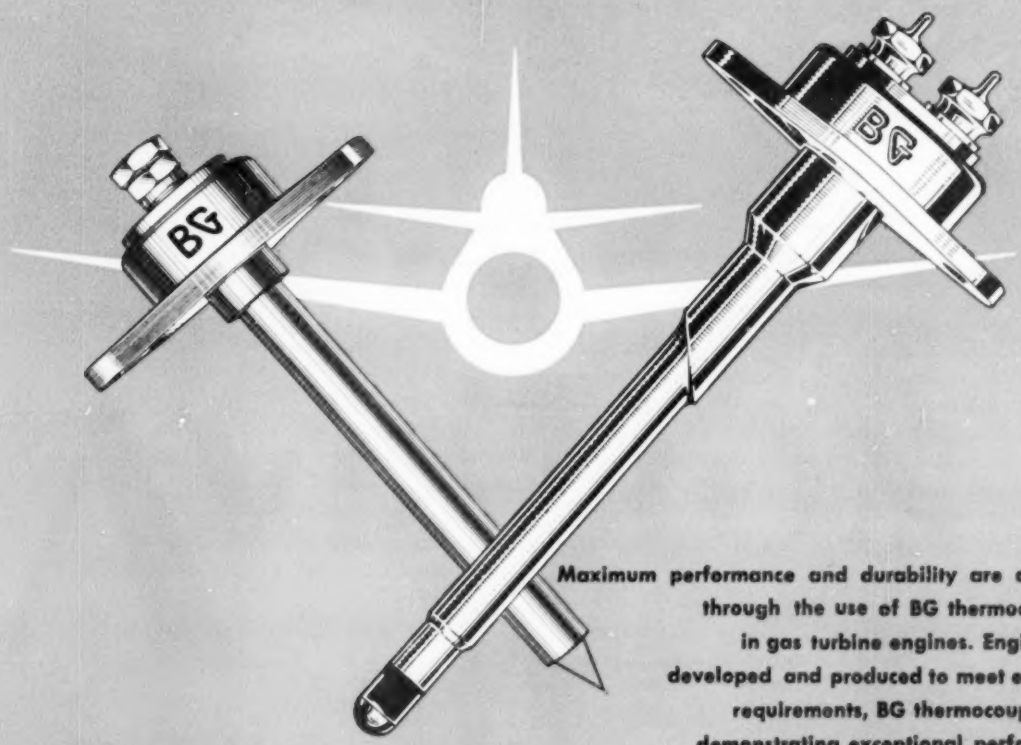

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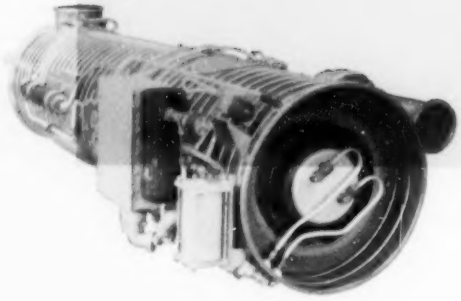

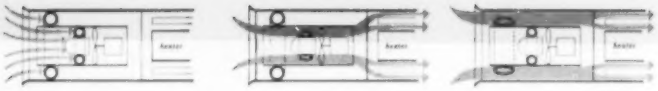

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Aviation Week

ABP Member ABC

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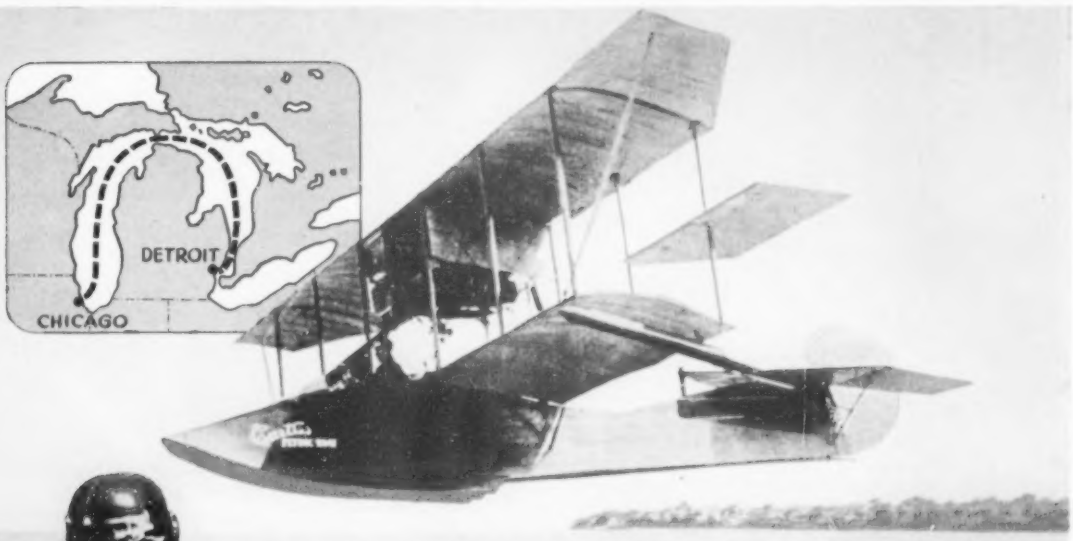
Havens Flies Hydroplane From Chicago To Detroit · 1913



THE FIRST LONG DISTANCE FLIGHT IN A FLYING BOAT—Beckwith Havens was the only pilot to complete the thousand mile endurance race over a circuitous route from Chicago to Detroit in 1913. It took him sixteen days, and then he continued on to New York. His flight in the Curtiss Hydroplane helped show the world just how wrong the skeptics were . . . like the noted scientist who, about that time, was said to have "proved conclusively" that it was impossible for heavier-than-air craft to fly successfully for any great distance.

IN 1953 over a distance comparable to that flown by "Becky" Havens in 1913, United Air Lines' new DC-6B Mainliner, cruising at a speed of 300 miles per hour, can make the flight in approximately 3 hours.

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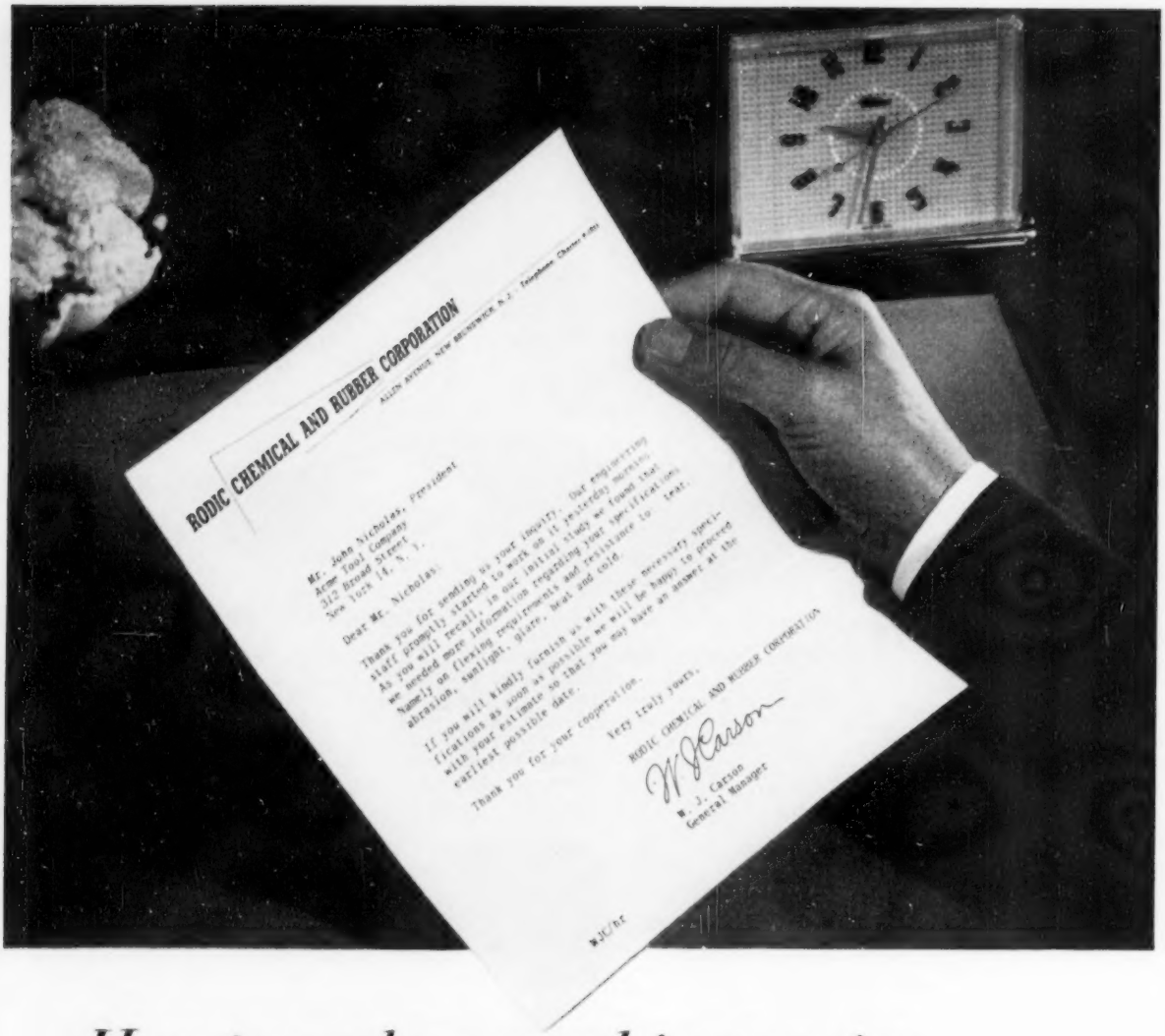
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NEWS DIGEST

Domestic

Lear, Inc., is working on a low-cost, single-axis lightplane autopilot designed to prevent inadvertent spins during instrument weather as a result of industry interest in an anti-spin device announced by Javelin Aircraft Co., Wichita, several months ago. Lear, which makes the L-2 three-axis autopilot for lightplanes, hopes to begin test flights of its new anti-spin device within 60 days.

Mutual Security Agency procurement authorizations last week included $1,990,000 for U. S. air bases in French North Africa. MSA earmarked $1,770,000 for aviation gasoline and $220,000 for lubricants and greases. Total procurement authorizations of $22,637,000 were approved for defense spending in Austria, France, French North Africa, French overseas territories and Formosa.

Ryan Aeronautical Co. has received an estimated $15 million in new orders from Boeing Airplane Co. under a continuing contract for C-97 Stratocruiser sections, boosting backlog orders at Ryan's San Diego factory to $80 million.

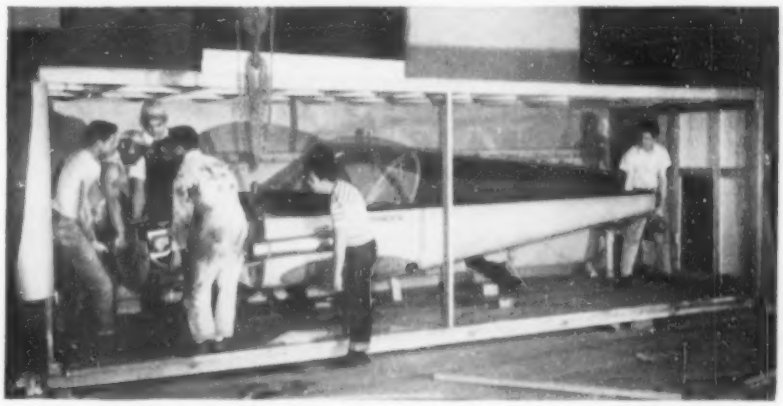
Grand Central Aircraft Co. is developing and producing solid propellants for rocket engines at its new plant near Pocoima, Calif. The Glendale, Calif., firm is manufacturing a new anti-aircraft weapon for the Army.

Hydro-Aire, Inc., Burbank, Calif., manufacturer of aircraft accessories, has set up a scholarship program for undergraduate students engineering, University of California at Los Angeles.

Convair says employe suggestions resulted in savings of $6,551,466 at the Ft. Worth plant last year. Cash awards for the suggestions totaled $17,626.12.

Richard S. Boutelle, president of Fairchild Engine and Airplane Corp., recently was awarded a royalty in a decision handed down by the Manufacturers Aircraft Assn. on a patented method of using exhaust gases and rammed air to improve cooling and increase thrust of piston-type engines.

Helicopter Assn. of America elected Carl Brady, Economy Pest Control, Yakima, Wash., as president at the organization's recent annual meeting in Ft. Worth. Also named were Elynor Rudnick, Kern Copters, Bakersfield, Calif., secretary, and H. A. Reidy, Helicopter Air Service, Inc., Chicago, treasurer.



FLETCHER FD-25 Defender, light tactical support plane, is pictured being boxed for shipment to Tokyo where it will be used as a demonstrator and to aid in production of the plane by Tokyo Airplane Co., Japan. Plans include checking out Japanese pilots in the plane. The little F-25 is designed to take off in 500 ft. with full load and land in 330 ft. Climb is rated at more than 1,000 fpm.

Charles S. Logsdon, National Aeronautic Assn. Contest Division director and leading U. S. authority on international aircraft records, has been named assistant secretary and assistant treasurer of NAA, succeeding the late Miss Mae Simpson.

Daniel Gurney, vice president and engineering director of Marlin-Rockwell Corp., Jamestown, N. Y., died Feb. 3. The 52-year-old industrialist had served on the National Advisory Committee for Aeronautics.

Armed Services Technical Information Service (ASTIA) has opened an eastern regional office in New York under the Air Research and Development Command.

Maj. Gen. Arthur Thomas, commanding general of the Eastern Air Procurement District, will retire from active duty Feb. 28 after more than 35 years' service. Thomas, World War II chief of the 12th Air Force Service Command, initiated the AF plan of having defense prime contractors exhibit items and components during subcontracting bids.

Financial

Gavco Corp., wholly owned subsidiary of General Aviation, reports record net earnings of $121,928.65 during the first eight months of the current fiscal year.

Parker Appliance Co., Los Angeles, had net earnings of $498,932 on sales totaling $11,040,530 during the last half of 1952.

International

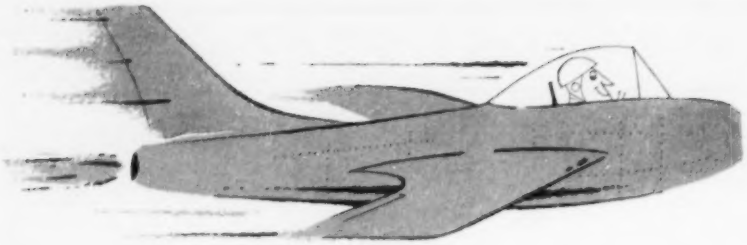
Ishikawajima Heavy Industry, one of Japan's leading machine manufacturers, is scheduled to begin production soon of ramjet engines for helicopters. First flight of a Japanese jet-powered copter will be made in March or April, an IHI spokesman says.

Nakajima Aircraft's major units, broken into separate companies by Japan's postwar anti-monopoly law, are merging into one plane production organization, it is reported from Tokyo. Next step in the merger of Fuji Industry, Fuji Auto Industry, Omiya Fuji Industry and Tokyo Fuji Industry is inclusion in the organization of Fuji Precision Industry.

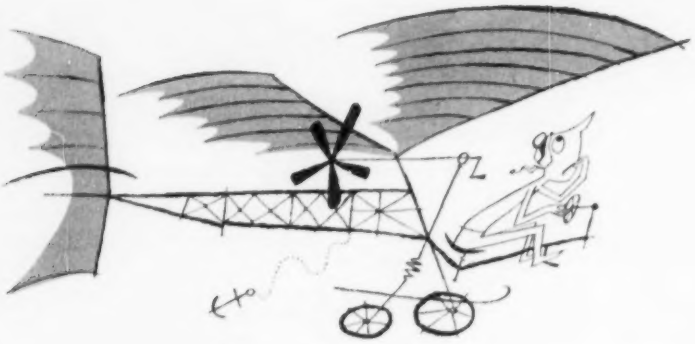
South African Airways is planning Johannesburg-London flights of British Overseas Airways Corp. de Havilland Comet jet liners, manned by South African crews, by next October.

De Havilland reports that aggregate flight time of Comets flown by the jet transport manufacturer, BOAC and Union Aeromaritime de Transport (France) recently reached a total of 11,000 hr.

British aircraft manufacturers exported planes valued at about $123,181,909 in 1952, the Society of British Aircraft Constructors reports.



THERE'S A BIG DIFFERENCE



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3H SAFETY CLAMPS

AVIATION CALENDAR

Feb. 18—New York Section of the Instrument Society of America, Hotel Statler, New York, N. Y.

Feb. 18-19—Eighth Annual Conference of the Society of Plastics Industry, Reinforced Plastics Division, Shoreham Hotel, Washington, D. C.

Feb. 22-24—Texas' Second Agricultural Aviation Conference, Texas A & M College, College Station, Tex.

Feb. 23-24—Conservation Panel of the Aircraft Industries Assn., Convair plant, Ft. Worth, Tex.

Feb. 28-Mar. 1—Seventh annual Pacific Coast Mid-Winter Soaring Meet, Torrey Pines Glider Port, San Diego, Calif.

Mar. 10-11—Eleventh Annual Conference, Society of the Plastics Industry Canada, Inc., General Brock Hotel, Niagara Falls, Canada.

Mar. 17-20—21st Annual Meeting American Society of Tool Engineers, Hotel Statler, Detroit.

Mar. 23-25—Third Midwestern Conference on Fluid Mechanics, University of Minnesota, Minneapolis.

Mar. 23-26—Institute of Radio Engineers National Convention, Waldorf-Astoria and Grand Central Palace, New York, N. Y.

Mar. 23-27—Eighth Western Metal Exposition and Congress, Pan-Pacific Auditorium, Los Angeles.

Mar. 23-28—Congress of Civil Aviation Conference, a joint meeting of trade organizations; theme: 50 years of aviation progress. American Association of Airport Executives is holding annual meeting simultaneously, Kansas City, Mo. Contact convention manager, Ross C. Roach, P. O. Box 315, Kansas City 41, Mo.

Mar. 25-27—National Production Forum of the SAE, Hotel Statler, Cleveland, O.

Mar. 31-Apr. 2—First International Magnesium Exposition, National Guard Armory, Washington, D. C.

Apr. 4-12—Second Annual International Motor Sports Show, Grand Central Palace, New York, N. Y.

Apr. 20-23—Aeronautic Production Forum, National Aeronautic Meeting and Aircraft Engineering display (SAE), Hotel Governor Clinton and Hotel Statler, New York, N. Y.

Apr. 20-May 2—Annual Conference of Technical Committee, International Air Transport Assn., Caribe Hilton Hotel, San Juan, Puerto Rico. Helicopter Symposium will be a principal feature.

Apr. 25-May 2—First annual National Transcontinental Handicap Air Cruise for private plane of 300 hp. or less, Philadelphia to Palm Springs, Calif., sponsored by Philadelphia Junior Chamber of Commerce.

Apr. 29-May 1—1953 Electronics Components Symposium (AIEE-IRE), Shakespeare Club, Pasadena, Calif.

PICTURE CREDITS

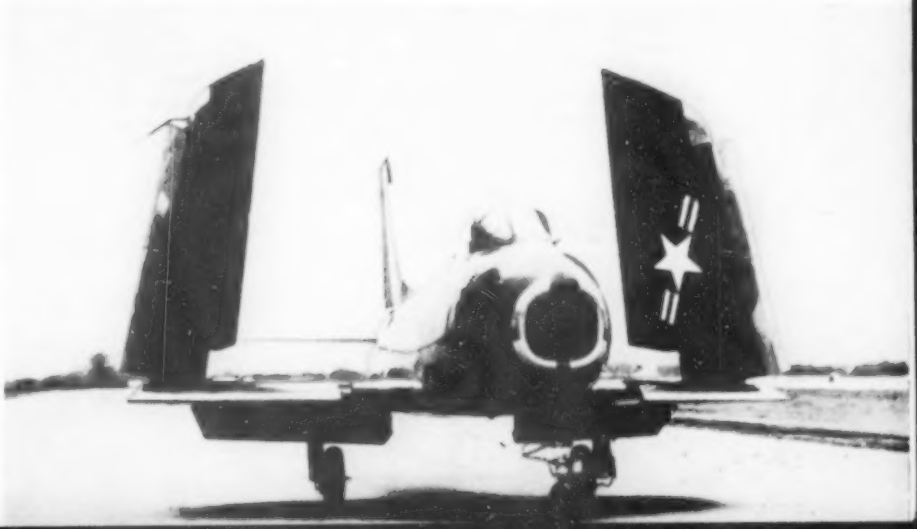
7—Fletcher Aviation; 9—(bottom) INP; 13-15—USAF; 17—USN; 18—Wide World; 54—Lockheed Aircraft Corp.; 56—Boeing Airplane Co.; 66,67,83—McGraw-Hill World News.

MYSTERE 4 ALOFT—At right is first photo showing the new Dassault Mystere 4 interceptor in the air. The single-seater prototype is powered by a Hispano-Suiza Tay engine. The plane has been demonstrated at low levels at 687 mph. at partial throttle. The wings are swept approximately 40 deg. The Mystere 4 is a development of the straight-wing Ouragon, now in service with the French AF, and the sweptwing Mystere 2, now in production. U. S. has provided heavy financial backing for the Mystere in its off-shore procurement program.

New Military Jets Show Their Stuff

CONVAIR SEA DART—New Convair XF2Y-1 Sea Dart delta-wing flying boat fighter (left) posed to show details of its novel hydro-ski landing gear. Considerable retouching has cloaked the Vee-shaped planing surfaces of the hydro-skis and features of the retractable struts. Cockpit of the Sea Dart is similar in design to that of the upcoming supersonic Convair F-102 delta-wing fighter for USAF. A number of Sea Darts have been ordered for tactical tests by Navy and the Marine Corps. Prototype plane, powered by two Westinghouse J34 jets, has been undergoing trials in San Diego Bay.

FURY WITH WINGS FOLDED—Initial photo (right) of the North American FJ-2 Fury sweptwing fighter showing how its wings can be folded for storage aboard carriers. The FJ-2 is the Navy version of USAF's F-86 Sabre but is fitted with four 20-mm. cannon instead of the Sabre's six .50-cal. machineguns. The 650-mph.-plus Fury is in production at NAA's Columbus, Ohio, plant. Powerplant is a GE J47-GE-2 of 5,800 lb. thrust.



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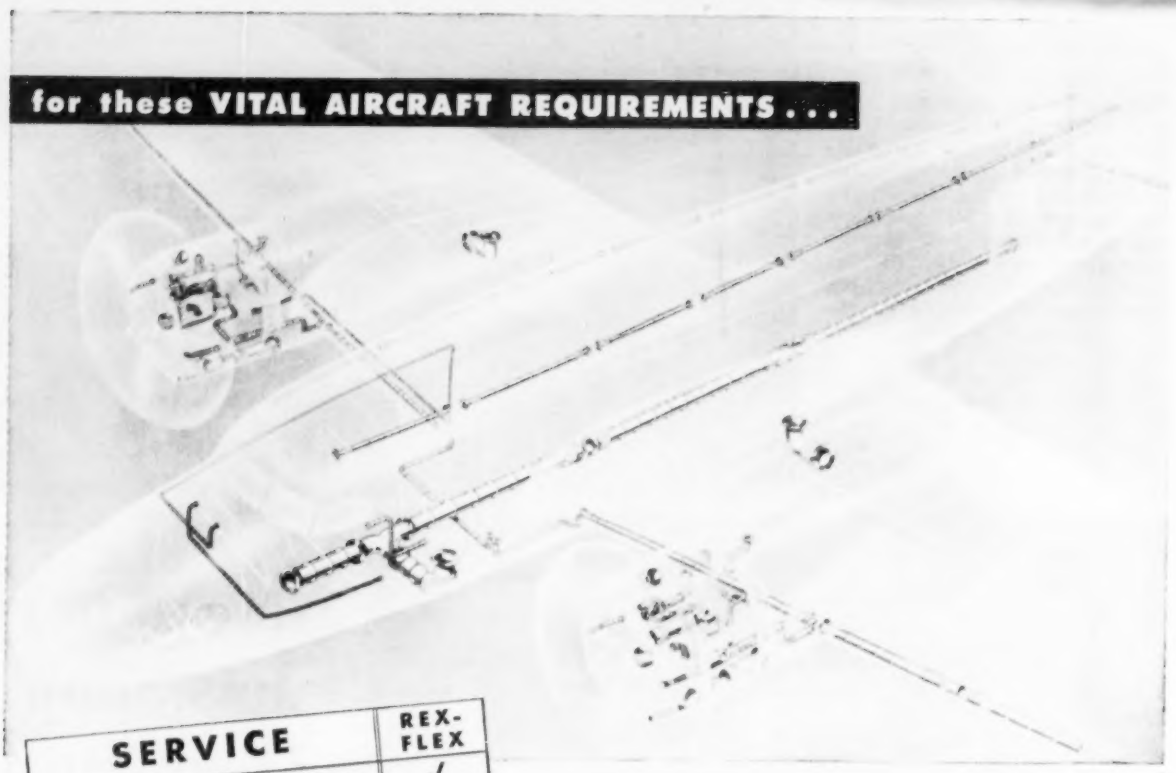

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WHO'S WHERE

In the Front Office

Myron B. Gordon, former vice president of Fairchild Engine and Airplane Corp., has been appointed president of Flight Refueling, Inc. **G. E. Woods Humphery** is chairman of the board of directors of the new American manufacturer of the British probe-and-drogue system for aircraft inflight refueling.

Gen. Robert J. Smith, president of Pioneer Air Lines, has been named a member and deputy chairman of the board of directors, 11th District of the Federal Reserve Bank. He succeeds **Robert B. Anderson**, who resigned to become Secretary of the Navy.

Al Krause has been named president of American Shippers, Inc., domestic airfreight forwarders in Los Angeles. Krause and **Gerow F. Miles**, new general sales manager, also were named to the company's board of directors.

G. Robert Henry has been appointed executive vice president of Bonanza Airlines. **David Martin** has been named superintendent of Bonanza stations.

E. V. Huggins, former Assistant Secretary of the Air Force, has been elected vice president of corporate affairs for Westinghouse Electric Corp., Pittsburgh. **James C. Frink** has been appointed eastern district manager of Westinghouse aviation, marine and transportation, and **Alexander Shirreffs** has been named supervisor of aviation and transportation in New York.

H. R. Baxter has been named chairman of the board of directors of Air Associates, Inc., Teterboro, N. J. New members of the board are **J. E. Ashman**, president; **W. H. Foulk**, and **A. R. McKay**.

Matthew J. Betley and **George J. Fischer** have been appointed vice presidents of Aeroquip Corp., Jackson, Mich.

Hugh F. Colvin has been named vice president and treasurer of Consolidated Engineering Corp., Pasadena, Calif.

Cecil Bardwell, co-founder and executive head of Bardwell & McAlister until his retirement in 1948, has rejoined the Los Angeles firm as a vice president and director. **Glenn E. Odekirk** has been elected a director.

William H. Steelow has been appointed vice president-manufacturing for Bowen Products Corp., Auburn, N. Y.

Paul E. Kelly has been named as vice president of Superior Tube Co., Norristown, Pa.

Changes

Gordon Burns has been appointed general manager of American Air Service, Charlotte, N. C.

William Davey has been promoted to director of manufacturing for Piasecki Helicopter Corp., Morton, Pa. **Neal L. Stetsen** has been named Piasecki production manager.

Sherrard Elliot, Jr., executive vice president of Equity Corp., New York, has been

(Continued on page 92)

INDUSTRY OBSERVER

► Manufacturers of jet engines for USAF are maintaining delivery schedules, but piston engine deliveries are lagging due to failure of automobile manufacturer licensees to get into production on schedule. Chevrolet's record in building Wright R-3350s is a notable exception, but Ford, Nash, Avco and Lycoming are lagging on their piston engine production programs.

► Braniff Airways is anxious to get a Navy AN/APS-42 navigation and storm-warning airborne radar for use on routes down the west coast of South America. Two written requests to the Secretary of the Navy have produced no results to date.

► Vickers V-1000 jet transport is designed for a maximum gross weight of 180,000 lb. for domestic use and 220,000 lb., for an international longhaul version. Thrust of the Rolls-Royce Conways for the V-1000 initially will be 9,500 lb., eventually increased to 11,500 (Aviation Week Feb. 9, p. 11 and p. 16).

► Air Coordinating Committee panel on air traffic control and navigation recommends an air speed of 45 knots (52 mph.) as the best approach speed for a typical helicopter with a power glide rate of descent of 500 ft. per minute. This speed would enable a single-engine helicopter to continue its descent at minimum auto-rotation speed in event of power failure, while a twin-engine copter could complete its landing at the best possible speed for single-engine operation.

► Problem of flutter in swept wings at transonic speeds is so serious that aircraft manufacturers have made a joint technical representation to NACA for a special research project to investigate flutter and recommend possible solutions.

► First flight tests of the fifth Custer Channel Wing aircraft are scheduled for March, about three months later than originally planned. The fifth model is a modified Baumann Brigadier twin-engine pusher. It is nearing completion at Baumann's Pacoima, Calif., plant under license from the Custer Channel Wing Corp. of Hagerstown, Md., for use of the patented channel wing arrangement which is aimed at gaining increased lift.

► New safety specifications for airport fueling tenders are being prepared by the air transport section of the National Safety Council and are expected to be ready for submission to oil companies and other interested parties this spring.

► USAF still is pressing Howard Hughes to sell the electronics portion of Hughes Aircraft Co., but a high asking price so far has discouraged prospective purchasers. Major electronics manufacturers are wary because of possible anti-trust angles, but several airframe manufacturers, including Lockheed and Convair, are interested. USAF is worried about production of airborne radar and air-to-air missiles, on which Hughes is sole supplier for the next generation of Air Force supersonic interceptors.

► USAF has awarded Douglas Aircraft Co. another large order for C-118 (DC-6B) transports. Latest C-118 order is for about 100 aircraft to be earmarked primarily for modernization of Military Air Transport Service fleets.

► New alloys developed in Britain for brazing of Nimonics and other high-temperature materials are reported to contain comparatively rare palladium and combine good mechanical properties with high-resistance to oxidation at elevated temperatures.

► Competition for U. S. titanium sponge producers is seen in energetic activities of Japanese in this field, with at least three firms bidding for a piece of the market here on basis of price and low Brinnel hardness of the material.

Washington Roundup

Defense Reorganization

President Eisenhower faces a touchy decision on reorganization of Defense Department. There are two ways he can proceed:

• **Ask Congress for direct legislation.**

This way, the President isn't likely to get more than compromise legislation. It probably would have numerous strings and qualifications tacked onto it. That has happened in the past.

After years of congressional wrangling, the 1947 Unification Act was compromise legislation which satisfied nobody completely.

In 1949, again after much congressional wrangling, compromise legislation amending the Unification Act was enacted. This did not thoroughly satisfy anyone, either.

Direct legislation would be handled by the armed services committees, where each service position has strong support.

Particularly, if Eisenhower, as expected, recommends greatly increased authority for the Defense Secretary, his reorganization legislation faces a risky future in Congress. Supporters of all three services probably would join forces and succeed in watering it down. It would take only a one-vote margin to defeat an Eisenhower proposal in the committees or on the floor of either house.

• **Submit a reorganization plan.**

This way, odds would be the President would accomplish in full the reorganization he wanted. But it would be at the expense of antagonizing congressional groups, particularly the armed services committees whose support is important to the success of the defense program.

A reorganization plan would become effective unless vetoed in 60 days by a constitutional majority of either house. There would be no opportunity to tack on amendments.

The reorganization plan would be handled by the government operations committees where the services are far less influential than in the Armed Services Committees. These committees, most observers feel, would be inclined to go along with the President.

New JCS Chairman?

There is strong congressional support to install a Navy man as chairman of the Joint Chiefs of Staff when Gen. Omar Bradley's term expires in August.

House Armed Services Committee Chairman Dewey Short explained: "It is the intention of Congress that the chairmanship should rotate. The Navy, as the senior service, is next in line. I want an admiral as chairman."

Top contender: Adm. Arthur Radford, commander of the Pacific Fleet.

Air Force might fight the appointment. As Vice Chief of Naval Operations, Radford was a leader of Naval opposition to the B-36 strategic air program in 1949 and bitterly opposed Defense Department unification in 1947.

Naval Air Switch?

Deputy Chief for Naval Air, Vice Adm. Matthias Gardner, is under consideration for transfer to Deputy Chief for Operations. Vice Adm. James Fife, Jr., present Deputy Chief for Operations, will round out two years' shore duty in July and is due for sea duty.

Mentioned as a possible successor to Gardner:

• **Vice Adm. John Ballentine,** who has served as air commander with the Atlantic Fleet for the past two years.

CAB, CAA Reorganization

• Commerce Secretary Sinclair Weeks, who will have an important voice in any reorganization of Civil Aeronautics Administration, wants to proceed cautiously. He told senators: "I think we will go along as we are at present. I am not going to change anything unless in my judgment I think it will be a change for the better."

• Top-ranking members of Senate Interstate and Foreign Commerce Committee have drafted legislation abolishing CAB and turning air transport regulation over to ICC. It is being held up for introduction until and if ICC accomplishes a reorganization recently proposed in a committee study. It may be dropped in the hopper, however, as an indication of dissatisfaction with the Board.

People

Rep. William Hess, who will head up the investigating subcommittee of House Armed Services Committee, plans to start off with a review of progress on standardization of military cataloging. Hess reports the subcommittee has received numerous complaints of favoritism in the award of contracts which will be investigated.

John Courtney, former Washington attorney who served during the war with Justice and Navy Departments, will continue as counsel of the investigating committee, headed last year by Rep. Edward Hebert. Hebert is ranking minority member this year.

Rep. Alvin O'Konski, who has carried on a running battle with Henry J. Kaiser over the award of aircraft contracts to Kaiser-Frazer Corp., has been named to the Armed Services Committee with jurisdiction over the matter. O'Konski wasn't a member of the committee last year. In floor speeches, he urged the committee to launch a full-scale investigation of Kaiser defense contracts. As a member, he may have more influence.

Sen. Everett Dirksen is chairman of the Judiciary Subcommittee, assigned investigation of alleged political influence in the appointment of high-salaried officials to head captured enemy firms. Sen. Alexander Wiley wants the group to start off with General Aniline Film and Dye Corp., headed by former TWA President Jack Frye. Dirksen was a member of the House select committee to investigate aircraft accidents in the early 1940s, under the chairmanship of the late Rep. Jack Nichols. After his defeat for re-election to Congress, Nichols became a TWA vice president, serving under Frye.

Sen. Edward Thye, new chairman of the Senate Small Business Committee, like last year's chairman, Sen. John Sparkman, has been sympathetic to the nonskeds in their fight with the scheduled airline industry. The outlook is the committee will continue to defend the nonsked position. Sparkman is ranking minority member.

Laurance Henderson, who, as counsel, has done spade work for the Small Business Committee in supporting the nonsked position, plans to leave the post in March to serve with Mutual Security Agency.

Assistant Secretary of Navy for Air John Floberg probably will return to Chicago law practice in time for the court season in the fall. **—Katherine Johnsen**

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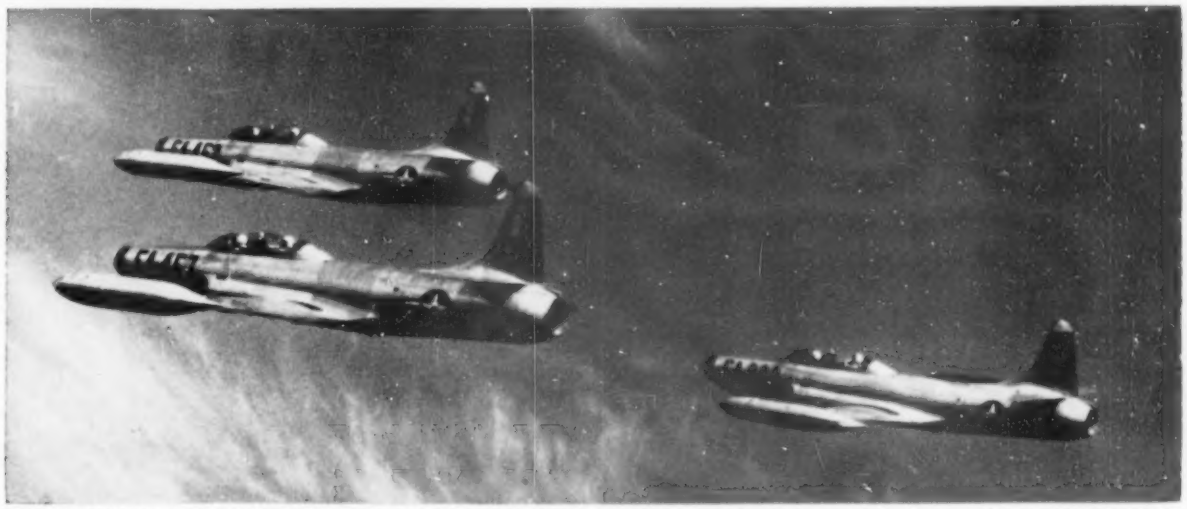


F-94 ALL-WEATHER FIGHTERS, backbone of Japan's defense team, fly around-the-clock patrols against possible Red bomber raids.

Report From Japan

USAF Tightens Japanese Air Defenses

- **Buildup of combat planes, bases and radar network gives our forces muscle to stop Red air violations.**
- **And Air Force is revealed prepared to drop A-bombs on Communist bases immediately, if orders are issued.**

By R. P. (Pepper) Martin
(McGraw-Hill World News)

Headquarters, Japan Air Defense Force—The United States was far from bluffing when it warned Russia that continued violations of Japan's air frontiers no longer would be tolerated.

Until a few weeks ago, that warning would have been only a threat without a punch to back it up. Now the situation is changed. Japan's air defense has grown from a bare skeleton to a muscular fighting force.

The expansion was logical and inevitable. The Soviet Union has been hammering at Japan in a war of nerves. Russian pilots brazenly flew over Japanese territory several times a week, in the face of American power and treaty guarantees. Russian air fleets maneuvered within sight of Japan, a clear warning of Soviet air might. An unarmed B-29 reconnaissance plane was shot down within sight of Hokkaido last year.

▶ **Ready With A-Bombs**—Today a vast radar network almost completely encircles Japan's home islands, guarding more than 5,000 mi. of coastline. F-86 Sabres guard Hokkaido, within a few minutes flying time of the area where Soviet intrusions normally occur.

New air bases have been built, others enlarged and underground storage constructed.

The Air Force is ready to carry out atomic bomb missions against Russian bases should the order be given.

▶ **Defense Buildup**—The story of this buildup starts in July 1950, shortly after the Communists swept across the 38th Parallel into South Korea. The weight of the Fifth Air Force, previously concentrated in the Tokyo complex at Yokota and Johnson Air Bases, shifted south to Itazuki, in southern Japan, and later to Taegu, Korea. Japan was stripped of combat strength except for two squadrons of the 347th Wing, flying F-82 Twin-Mustangs, and two squadrons of the 35th Fighter-Interceptor Wing.

The 314th Air Division was activated in Japan in late 1950 with the primary mission of supporting the Fifth Air Force in Korea. The Fifth's A-1 and A-4 remained in Japan under the Commander, Fifth Air Force Rear. By March 1952, both Fifth AF and the 314th AD had grown to such immense size that Gen. O. P. Weyland, Far East Air Force commander, split the command and activated the Japan Air Defense Force.

A modest construction program was started in 1950 to beef up the air defense structure. The network of bases Japan had constructed in World War II had been ploughed under during the demilitarization of Japan. Although the Air Force effort was concentrated primarily on Korea, construction in Japan progressed slowly but perceptibly. In March 1952, when appropriated funds became available, the program went into high gear. For the first time there was a clear-cut mission: to provide for the air defenses of Japan and furnish tactical air support for U. S. Army divisions assigned to the defense of the Japanese home islands.

▶ **Radar Network**—Heart of the program is the radar network woven into an intricate pattern to fit the convolutions of Japan's topography. Honshu, for instance, resembles an elongated boomerang but requires a radar net on both coasts because of the towering mountain range stretching the entire length of the island.

Obsolete World War II radar was

installed on an emergency basis. It is now being replaced with modern equipment. Backup equipment also is becoming available. New sites are being selected to provide maximum coverage. When completed, each site will be manned by three officers and 132 enlisted men. There will be solid protection against enemy planes coming in at 500 ft. or lower, the altitude where it is hardest to spot a raiding force. Under ideal conditions, planes at 10,000 ft. can be spotted more than 100 mi. away and those at 30,000 ft. more than 150 mi.

One key station is at the extreme northern tip of Hokkaido, and another is on the eastern coast, opposite the Russian-occupied Habbomai Islands and guarding the approaches from the Kuriles. This station is less than four miles from a Russian radar station. The northernmost station faces Sakhalin, where the Russians have built up a powerful air complex.

Backing up the radar net are ground-control intercept stations, built at strategic points to pick up and track enemy flights, and to control airborne defense planes.

Linking all of the outlying stations with command centers is an elaborate spider-web communications system using landlines, FM, radio telephone and CW. Within minutes of detection of unidentified aircraft, interceptors can be airborne. If the threat appears serious, the entire JADF and ground forces can be quickly alerted. Practice sabotage has been carried out at primary outlets to test the flexibility of emergency alternate-type systems.

In one month last year, the radar network tracked more than 50,000 planes. In that month, only 113 planes tracked by one unit could not be identified within five minutes. Ninety-six of the 113 were identified shortly after, through flight plans. Fifteen were identified visually by fighter pilots. Only two tracks remained completely unidentified, and they may have been flights of geese.

► **Nerve Centers**—Japan is divided into three defense zones with an air division—the 39th, 41st and 43rd—assigned to each. Each division headquarters has an "air defense control center" that coordinates radar reports and controls all American aircraft in the zone.

Each AD commander is responsible for defense of his area. He issues the orders to scramble interceptors when unidentified planes approach. His command post vectors the pilots to the target and issues the final order: "Shoot to kill." If an air attack appears imminent, he orders "red alert" and flashes word to Air Defense Force headquarters, which is responsible for alerting all military installations throughout Japan. He also commands anti-aircraft units.

AIR FORCE F-94 INTERCEPTOR flys over Mt. Fuji in stepped-up defense alert.

A small room at ADF headquarters—lined with charts and map overlays—is the command's nerve center. The charts give disposition of all combat aircraft and their status, whether on ground alert, in reserve or inactive. The extent of Russian air activity on the current and preceding days is available immediately. A huge overlay map with coordinates covers an entire wall ready for plotting unidentified aircraft approaching Japan.

This air defense operations center is the link between the three air divisions and other defense units, including the Navy, Fifth Air Force, First Marine Air Wing, FEAF, XVI Corps, USAFFE and 20th Air Force on Okinawa. Here the decision would be made to alert all military installations, to transfer fighters from one division to another, and to alert Fifth and 20th Air Forces to the possibility that additional planes might be needed in Japan.

► **Team Operation**—Maj. Gen. Delmar T. Spivey, while he was commanding general of JADF, persuaded the Army and Navy that efficient defense of Japan, required close teamwork. The Army bought the idea after a division general on maneuvers in the field spent two hours trying to telephone JADF for close support. The Navy was somewhat more cooperative if for no other reason than the fact it used shore bases and understood the requirements of aircraft control and warning.

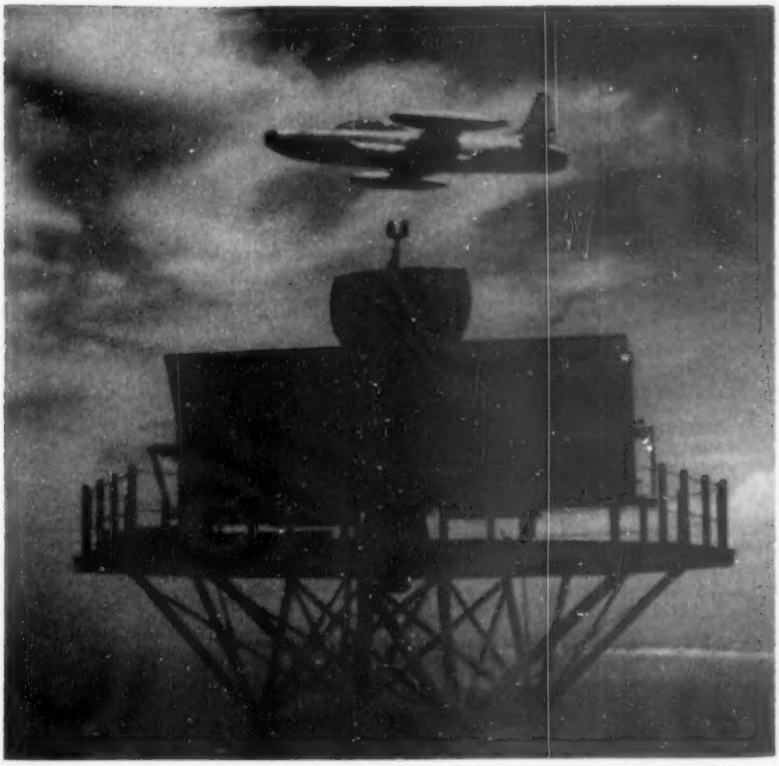
Now XVI Corps and the Navy have liaison officers at JADF headquarters. A Joint Operations Center has been established on a standby basis at an airfield near Tokyo to facilitate communications with all Army units in Japan.

Navy ship commanders calling at the port near JADF headquarters are under orders to learn the communication system. Four months ago, Navy air was integrated into the defense system. Special UHF channels are monitored 24 hours a day and carrier-based planes can be ordered to the danger zone if they are needed.

A fast carrier task force could not have carried out joint maneuvers with the Air Force 18 months ago. Now it is done efficiently and often.

► **JADF Muscle**—JADF has its own planes specifically assigned to the defense of Japan. They are no longer the reserve for Korea. Pilots sent here for training go into either the 35th Fighter-Interceptor Wing or the 27th Fighter-Escort Wing, rather than the Fifth AF. The power is made up of F-86s, F-84Gs, F-94 all-weather night fighters, F-80s and F-51s for close support of ground troops, weather and reconnaissance planes, and air-sea rescue planes. B-29s and B-26s are in Japan and available, although they are not a part of the JADF command.

Base construction and improvement has been on a fairly elaborate scale. Installations on Hokkaido provide JADF



RADAR NETWORK gives patrolling fighters early warnings of unidentified aircraft.

with bases within jet range of Russian fields in the Kuriles and Sakhalin. Misawa, the big air base in northern Honshu, is capable of taking SAC's heaviest planes. A number of fields throughout Japan have been improved and the runways lengthened. Taxi strips and revetments have been added. More than $4 million was expended for underground oil and petroleum systems at eight major bases. All construction was done by Japanese contractors.

A lot more is known about Russian air strength in the Far East than can be divulged. Some of the radar stations in Japan do little except track Russian flights in Sakhalin and the Kuriles. Analyses of the tracks provide a picture of what the Russian air force is doing, from ground-controlled landings to mass practice bombing raids on targets at sea.

▶ **Russian Radar Screen**—Russian radar is considered as good as American World War II equipment, and their latest models may be better than ours. Radar used by the Reds in Korea has proved extremely efficient. The Russians have girded the maritime provinces, Sakhalin and the Kuriles with a radar network probably on a denser scale than the American net in Japan. Unless the Russians want to provoke an incident, they can recall any planes near the Japanese border once their radar spots American planes taking off from fields in Hokkaido.

The Japanese had nine airfields in the Kuriles and 15 in the extreme southern end of Sakhalin. The Russians improved these and built new ones. They are the advance bases for the powerful complex on the Russian mainland.

The bases in the Kuriles have facilities to maintain three groups, while southern Sakhalin can support several times this number. More than 700 planes are believed to be based in these two areas, a number that probably could be doubled. At least half of the 700 are believed to be MiG-15s. TU-2s, modeled after the B-29 Superfortress, have been reported on Sakhalin, but no jet bombers have been sighted.

▶ **Red Offensive Potential**—Russian offensive capabilities against Japan are considered limited, at least on the basis of current publishable intelligence. MiG-15s flying from Sakhalin and the Kuriles can reach Misawa air base in northern Honshu. Central Japan, at least the Tokyo area, is just out of range of MiG-15s which are based in Manchuria.

The TU-2s can reach any part of Japan from the China mainland, Port Arthur, Vladivostok or Sakhalin. But unless the Russians have developed a long-range jet fighter, the TU-2s would be confined to night raids without escort. This estimate does not take into consideration jet bombers the Russians may have developed.

No one here anticipates a lightning blow, but possible expansion of the Korean war this spring could bring enemy retaliation against bases in Japan.

A Red air raid would touch off JADF's control and warning setup—a chain of modern air bases extending from Hokkaido to Kyushu—and command and facilities establishment, built in such a way that needed units of the Fifth Air Force could be transferred here and begin functioning almost immediately. Combined, these forces are considered powerful enough to cope with anything the Russians might throw at Japan.

▶ **War Zone Operation**—JADF is far more than a defense force. Each air division has an Air Base Wing that runs all facilities and provides logistical support for radar sites, bases and AAA groups. It also supports and maintains BomCom in Japan, provides facilities and logistical support for the Fifth Air Force rear echelons charged with repairs of all planes from Korea and operates an air base for the First Marine Air Wing.

JADF carries out photo flights and reconnaissance. It has a radar calibration squadron, a reconnaissance technical squadron that evaluates photographs, and an air-sea rescue squadron. It operates a 750-bed Air Force hospital at Nagoya and another hospital near Tokyo.

It also operates a number of technical schools for Far East Air Force. One of the largest is the Air Ground Operations school, where students mostly are Army colonels. Marine and Marine aviation officers also have attended this school.

▶ **Training Pays Off**—One of the most important schools is for training radar technicians and maintenance men. The training has already paid off. Gen. Spivey reports that despite use of old and worn-out equipment, only 5 to 6% is inoperational because of maintenance at any one time. He attributes this "amazing record, better even than in the United States," to the training program and indoctrination.

"The men realize they're next to a war zone and we might get hit any day," Spivey says. "They are in isolated spots and many of them work 16 hours a day keeping the equipment in shape."

By 1954 Japan will have one of the world's most complete air defense systems.

The total construction costs by that time will be $125,971,916. Radar sets and other equipment may run three times this amount.

▶ **Weakest Link**—Perhaps the greatest weakness in JADF is the failure to integrate Japanese into the system so that sometime in the future they could

take over the job of defending their own country.

At least two plans have been drafted for the integration of the Japanese into JADF:

• The first covered training of Japanese technicians to take over AC&W and communications. Japanese were to be trained in the U. S. for eight months and returned here to establish schools to train other Japanese.

• A second plan called for training of a Japanese Air Observer Corps to take over if, as anticipated, a substantial part of the radar system was knocked out in the first day of war.

Far East Air Force approved both plans, but Gen. Mark Clark's headquarters turned them down on the grounds that the Japanese did not have a defense establishment of their own that was capable of handling the program.

Despite the restrictions, casual integration does go on. Japanese mechanics help the Americans at the big radar sites. Japanese are being trained to handle the 120-mm. anti-aircraft guns and the automatic weapons defending the major bases.

► **AF-Army Fight**—The problem boils down to a continuing argument between the U. S. Army and U. S. Air Force over what type of defense force the Japanese should develop:

• At the present time the Army is concentrating almost exclusively on building a new Japanese army, neglecting plans for an air force. Army officers echo the Japanese argument that Japan can not afford to maintain a modern air force.

• But JADF officers believe a six-wing air force—about 500 jet interceptors plus adequate reserves—would enable the Japanese to defend themselves against anything but an all-out Russian assault.

Dollar for dollar, according to the Air Force argument, both Japan and the United States would get more for their money from a small but efficient defensive air force than from a large army that might be immobilized by air power and could not defend Japan's cities from air attack.

No top-ranking Air Force officer believes the USAF can or should remain in Japan indefinitely. It would be bad politics, expensive and a tremendous drain on manpower. The Japanese could do the same job at a much lower cost.

In one month, for instance, JADF expended $12,264,002 for personnel, supplies and other purposes. If by 1954 the Japanese could take over AC&W, the majority of the several-thousand Americans to be assigned to the system when it is completed could be transferred to other duties. The saving would be considerable.

Perfect Safety Year for Skeds

Domestic U. S. scheduled airlines Feb. 11 completed a year of operations without a single passenger fatality and were scheduled to receive a National Safety Council award for this outstanding achievement in safe transportation.

The record set by the 30 domestic lines was during a period when they averaged one landing or takeoff every seven seconds, or approximately 13,000 each day. The airlines flew 13,150,000,000 revenue passenger-miles during the period.

Adm. Emory S. Land, president of the Air Transport Assn., who was to receive the award in behalf of the airline members of the association, pointed out that the new safety record showed that flight safety has more than kept pace with the growth in airline operations through the years.

In each month during the record period, the domestic lines flew more passengers and more passenger-miles than were flown by domestic U. S. lines in the entire year of 1938. During the months of August, September and October of 1952, domestic scheduled passenger-miles each month were double the number for the entire year of 1938.

The record year is the first achieved by the domestic airline industry since the 12-month period ending March 27, 1940.

Spares Study

- **Economies in AF spares set up by special group.**
- **Savings by 'guinea pig' program: $53 million.**

Basic methods for reducing the cost of Air Force airframe and engine spares have been developed by a special USAF study group headed by Harry O. King, New York industrialist.

Using the Boeing-Lockheed-Douglas B-47 Stratojet production program as a guinea pig, the King group has effected economies estimated at $53 million:

• $18 million cut from fiscal 1952 funds earmarked for B-47 airframe and General Electric J47 jet engine spares.

• $35 million cut from fiscal 1953 funds earmarked for Allison J33 and J35 spare turbine blades; wing fuel tanks, and jet engine nozzle diaphragms.

► **Recommendations**—Initial use of the procedures developed by the King group was applied at the Oklahoma City Air Depot where rests the primary responsibility for servicing and maintaining USAF's B-47 Stratojet fleet. Noting that the approach to reducing spare expenditures cuts across many USAF command lines, the first report of the King group recommends three principal approaches to the problem:

• **Expansion of military airlift** to reduce the quantity of spares now required to fill the pipelines between depots and user commands. The King group is now studying and experimenting with the airlift of Pratt & Whitney R4360 piston engines to get data on pipeline reduction possibilities.

• **Revision of engine spare** requirements in line with current operational experience, particularly for jet engines. Increased durability of jet engines in actual operations has indicated that spare requirements can be lowered considerably. New methods of field maintenance of jet engines involving replacement of critical parts by operating units also offer considerable promise in extending the time interval between major depot overhauls. This in turn would reduce pipeline requirements.

• **Development of new control methods** on all high dollar-volume spare items in the USAF inventory. Initial studies by the King group revealed that 2.3% of B-47 airframe spare items accounted for 60% of the total funds programmed for B-47 airframe spares. By concentrating on development of new procedures for handling these high dollar-volume items, greater economies can be affected than by an overall approach to the problem. The 2.3% represented 163 items of the 6,800 items carried in the B-47 spares inventory.

The B-47 program was picked by the King group as first point of attack because it is the largest USAF production project and involves parts interchangeability among three manufacturers. Procedures developed during the B-47 study eventually will be applied to other airframe and engine programs, with the highest priority for larger projects.

► **Savings**—A "conservative" estimate by King stated that further application of methods already developed could save several hundred million dollars.

The King group was organized by the Air Force last July after Sen. Homer Ferguson charged USAF spares procurement policies were wasteful and extravagant. In addition to King, the group includes: James Kelley, Boston University economics professor; Jacob Saliba, industrial engineer and a staff of USAF technicians.

GOP Defense Setup Nears Completion

The new Defense team, now almost complete, is concentrating on briefings preparatory to taking over the department's reins.

Air Force probably will be the only service that will not keep a holdover appointee for continuity in its top command. There was some chance either Undersecretary Roswell Gilpatric or Assistant Secretary E. V. Huggins would stay on temporarily. But new Air Force Secretary Harold Talbott indicated he preferred filling these posts with his own selections. Senate refusal to confirm nominees holding stock in corporations doing defense work was "seriously handicapping" him in obtaining top aides, Talbott said.

In a public statement, Robert Chapman Sprague revealed that the Eisenhower Administration had decided not to submit his name in nomination as Undersecretary of the Air Force because of his stock holdings in the Sprague Electric Co., of North Adams, Mass. Sprague said his reasons for not disposing of the stock "included the fear that stock control might pass to out-of-town investors with consequent possible ill effects on the community which depends heavily on the Sprague company for its economic well-being."

▶ **Make Electronics**—Sprague noted that he had resigned Jan. 12 as president and director of the company which he founded in 1926 and that the Sprague board of directors, at his request, passed a resolution declaring that the company would not do business with the Air Force during his tenure of office with the USAF.

About 36% of the Sprague company's 1951 business was subject to the Renegotiation Act of 1948, and 1952 figures were expected to be slightly higher, Sprague said. The firm makes basic electronic components for about 600 manufacturers.

There was no immediate indication of Talbott's choice of a successor to Sprague in the Undersecretary post.

Earl Johnson is staying on as Undersecretary of Army and John Floberg remains as Assistant Secretary of Navy for Air.

▶ **Defense Setup**—Here is a rundown on the new team:

• **Secretary of Defense Charles E. Wilson,** former president of General Motors Corp., was confirmed by a 77-to-6 Senate vote. These senators opposed his appointment: Olin Johnston, Harley Kilgore, Herbert Lehman, Wayne Morse, Matthew Neely and Willis Smith.

• **Deputy Secretary of Defense Roger Kyes,** former General Motors vice president, was confirmed on a voice vote.

• **Assistant Secretary of Defense W. J. McNeil,** World War II rear admiral in the Navy Supply Corps, is continuing as comptroller.

• **Assistant Secretary of Defense Frank Nash,** a legal assistant to the late Secretary of Navy James Forrestal during World War II, has been confirmed to handle international defense programs, a job he held as an assistant to former Defense Secretary Robert Lovett. Wilson has recommended his increase in rank to Assistant Secretary.

• **Assistant Secretary John Hannah,** former president of Michigan State College, has been confirmed to handle manpower problems.

• **Secretary of Air Harold Talbott** was confirmed by the Senate by a 76-to-6 vote, with these senators opposing: J. William Fulbright, Albert Gore, Estes Kefauver, Harley Kilgore, Wayne Morse and James Murray.

• **Undersecretary of Air** still was vacant.

• **Assistant Secretary of Air** H. Lee White, a New York lawyer, was nominated to handle management functions. White, born at Oswego, N. Y., in 1912, was graduated from Hamilton College and Cornell Law School and was associated with the New York law firm of Cadwallader, Wickersham & Taft. He served as a Naval officer in the Office of the Secretary of the Navy during World War II, finishing with the rank of commander.

• **Assistant Secretary for Air.** This post was open with Huggins, former executive vice president of Westinghouse Electric International Co., staying on temporarily.

• **Secretary of Navy Robert Anderson** was confirmed with unanimous support both in committee and on the Senate floor.

• **Undersecretary of Navy Charles Thomas,** former president of Foreman & Clark, retail clothing firm, and one-time director of Lockheed Aircraft Corp., was confirmed without Senate opposition.

• **Assistant Secretary of Navy.** Anderson said he doesn't expect to fill the second assistant secretaryship in the immediate future. Floberg has been asked to stay on as part of the new team, Anderson said.

Copter Production Record Set by Bell

Helicopter production at Bell Aircraft Corp.'s new multi-million-dollar plant in Fort Worth last year topped the total output of all other rotary-wing aircraft companies, Texas Division manager Harvey Gaylord reports.

Production involved the utility Model 47 and Navy's tandem-rotor anti-submarine HSL. Experimental work was done on the Air Force XH-15 high-altitude helicopter and the H-12, an 8- to 10-place transport copter.

Engineers at the Helicopter Division are developing a new convertiplane and designing a large tandem-rotor transport, Gaylord says.

COUGAR CLOSEUP

Newest Grumman fighter announced in production is the sweptwing F9F-6 Cougar, shown here coming almost head-on. Careful study of the original photo yields some clues to the Cougar's novel lateral control system, which apparently embodies unusually small ailerons, with most of the action derived from use of large-span double-section spoilers. Also noticeable in the original print, projecting from each upper wing, are approximately 30 tiny "fingers," whose purpose is unexplained. The F9F-6 is powered by a 7,250-lb.-thrust P&WA J48. Also being built is the Allison-powered F9F-7, identical except for engine. A camera-carrying version also has been ordered, the F9F-6P.

Lightplane Sales

- **Six companies delivered 3,058 aircraft in '52.**
- **Industry records first upswing since 1946 boom.**

Shipments of 3,058 utility aircraft valued at $26,159,000 were reported by six U. S. manufacturers for 1952, showing an upward climb for the first year since the 1946 postwar boom.

Deliveries climbed 32.8% over last year's 2,302 planes, while dollar value climbed sharply to 54.9% over last year's $16,887,000, Joseph T. Geuting, Jr., Utility Airplane Council manager, announced. Based on large backlogs of unfilled lightplane orders now on manufacturers' books and the uptrend of last year, he predicted the upswing in plane sales will continue through 1953.

The civil aircraft upswing is in addition to increased production by the same companies for military aviation. Today, more than two-thirds of the total activity of lightplane companies is devoted to defense production, Geuting estimated.

▶**Off the Shelf**—Hundreds of virtually off-the-shelf civil aircraft have been purchased as military liaison and trainer planes by the U. S. and members of the North Atlantic Treaty Organization. In one case, the entire initial production of a new executive aircraft designed for civilian use, the Beech Twin-Bonanza Model 50, was taken over by the Army.

Tabulations showed that Cessna Aircraft Co. continued its leadership in total aircraft produced, with 1,373 planes valued at $9,220,000. Of these, 1,183 were Model 170 four-placers. Piper ranked second with 1,161, including 477 Super Cub trainers and 682 Pacer four-placers. Total dollar value of Piper's production was $4,891,000.

Beech Aircraft Corp. ranked first in dollar volume with $9,848,000. Beech delivered a total of 414 planes, including 356 Bonanza four-placers, one Twin-Bonanza six-placer, and 57 Twin-Beech D-18s.

▶**Some New Competition**—A newcomer, Aero Design & Engineering Co., Oklahoma City, delivered 39 twin-engine Aero Commanders for dollar value of $2,011,000.

Other deliveries included Mooney Aircraft: 49 M-19 Mite one-placers, $100,000; Taylorcraft, 15 two-place Sportsman and five four-place Tourists, $82,000. Two other one plane shipments were a Model E Ercoupe valued at $4,000 from Engineering & Research Corp., and a Luscombe GC-1B valued at $3,000.

▶**Utilitarian Planes**—Significant was the fact that the total included purchase of 2,512 four-place and larger aircraft—almost all for utilitarian uses in business, industry and agriculture. This contrasted with the boom year of 1946, in which 90% of the deliveries were two-place or smaller and the primary production was for low-horsepower planes, used mainly as trainers and for sport flying.

Geuting pointed out the upswing in small aircraft marketing had been delayed by the denial of materials for civil aircraft production at the outbreak of Korean hostilities.

When materials restrictions were imposed, some companies—notably Ryan Aeronautical (builder of the Navion), Luscombe, Temco and Erco—went out of the personal-plane business.

With the easing of material requirements, the first solid demand exceeding supply in several years is being met by increased production of the remaining companies.

NORTHEAST Convair crash-landed Feb. 8 at La Guardia. Report of prop reversal probed.

Prop Reversal Probed in Crash

Two phases of the continuing serious technical problem of inadvertent propeller-pitch change in flight last week had aircraft and airline industry attention focused on them.

• At La Guardia Field, New York City, Civil Aeronautics Board investigators were checking the right Curtiss Electric propeller of a Northeast Airlines Convair-Liner for indications of reversal after the pilot made an emergency crash-landing Feb. 8. Pilot reported the plane yawed heavily to the right in an approach at 130 mph. about 100 ft. above the airport. No occupants of the plane were reported seriously injured.

• Meanwhile, representatives of federal agencies, airlines, airline pilots, and propeller manufacturers conferred in Washington at a closed session over proposals for preventing inadvertent reversal: relief values in the hydraulic system of Hamilton Standard propellers and rewiring for Curtiss Electric propellers.

The Northeast La Guardia crash-landing chalked up another score in favor of the passenger protection provided by the sturdy fuselage construction of the pressurized-cabin Convair. The plane hit the runway on the right landing gear with such impact that the right wing was sheared off and folded back against the fuselage. The break point was near the root, inboard of the engine.

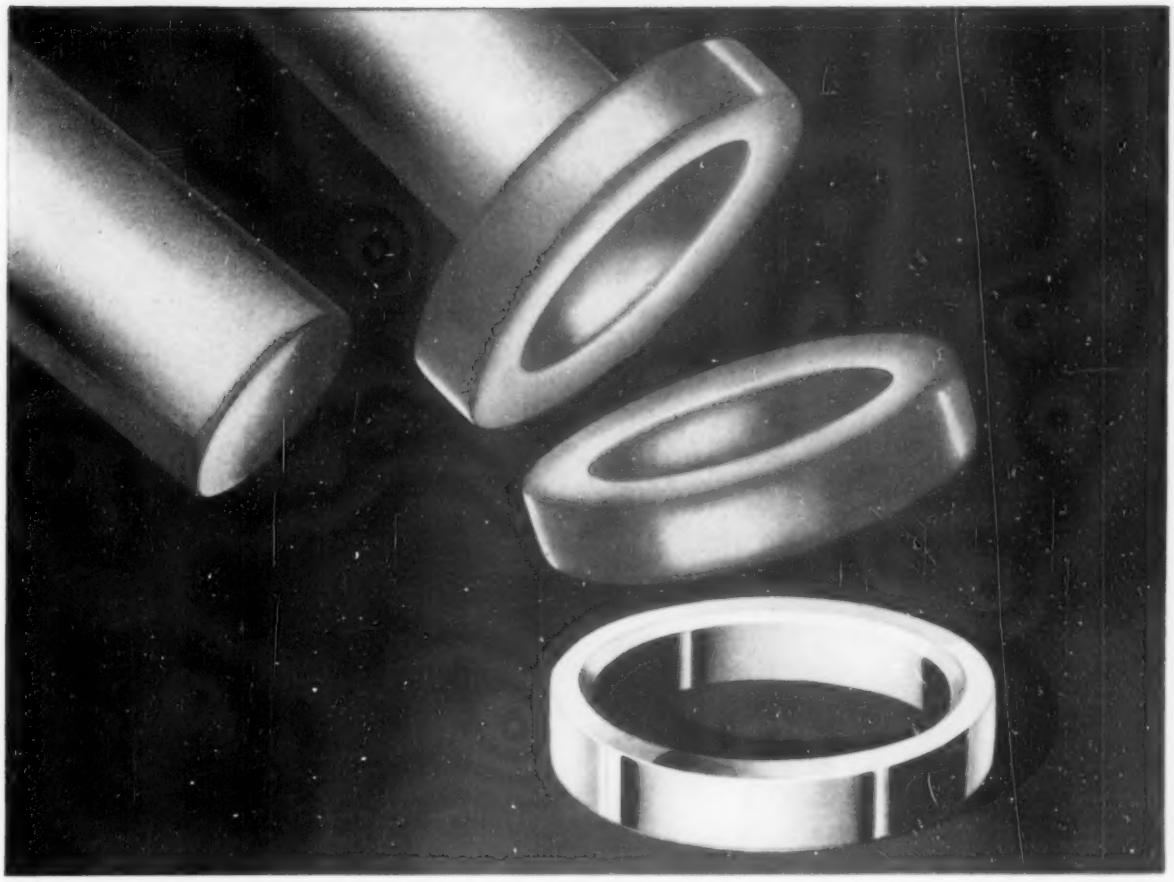
The plane swung into a 180-deg. groundloop before coming to a stop in a marshy area 200 ft. off the runway. It is believed the marsh may have cushioned part of the momentum. The passengers exited without major difficulty and the accident was not complicated by adverse weather conditions or fire factors.

First reports indicate the propeller blades had turned to very flat pitch, with only two degrees of positive pitch, but had not gone into full reverse. Complete reversal would be reached at a blade angle of 16.7 deg. negative, while normal low-pitch position has a blade angle of 26.3 deg. positive.

CAB investigators headed by Joseph Fluet, New York, were not expected to issue findings on the case until after further examination of the propeller blades and hub mechanism, checking the flight path, and interviewing the passengers. Three passengers were reported to have suffered minor injuries in the accident.

Correction

A gift of 3,200 shares of common stock of Aro Equipment Corp. by John C. Markey, president, was erroneously reported as a sale in the Jan. 26 issue of AVIATION WEEK.



Forged-in Quality means Longer Life for Eaton Valve-Seat Inserts

Eaton steel valve-seat inserts are made from hot-upset and pierced blanks. The forging process improves the physical characteristics of the steel, and provides superior wearing qualities in the finished inserts.

The Eaton Saginaw Division is equipped by years of experience, and modern specialized equipment for the high-volume production of seat inserts in all types and sizes—iron and steel, puddled or plain—for aircraft, motor cars, trucks, tractors, and Diesel engines.

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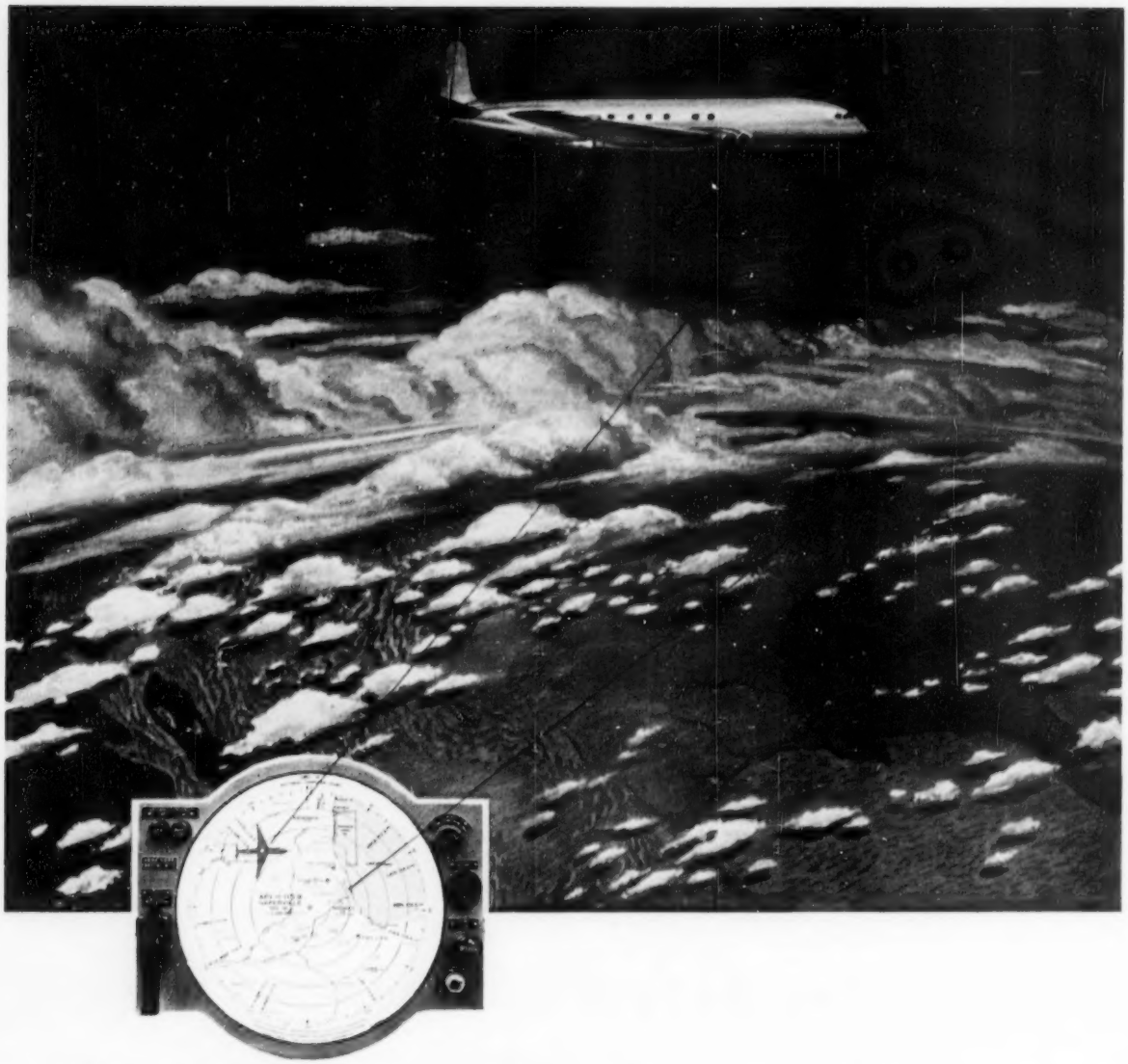

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Arma's new Pictorial Computer shows a pilot his exact location and heading, continuously on a projected map—throughout a given flight. Here's how it works:

A film strip containing as many as 700 maps shows the various OBD stations over which the aircraft will pass. During flight, the Arma Computer automatically indicates position and heading of the plane on a TV-like screen. In other words, the Computer shows continuously and exactly where the plane is in respect to the ground, at every moment of flight—regardless of weather, altitude or speed. It automatically tunes to the appropriate OBD frequency, automatically adjusts for scale of map and has provisions for automatic chart changing.

Arma has worked closely with the Air Navigation Development Board and the Civil Aeronautics Administration in developing this Pictorial Computer for use in proposed advanced systems of air navigation and traffic control. For 35 years Arma has worked hand in hand with the Army, Navy and Air Force—and more recently with the Atomic Energy Commission—in developing important military control systems. *Arma Corporation, Brooklyn, N. Y.; Garden City, N. Y. Subsidiary of American Bosch Corporation.*

ARMA ADVANCED ELECTRONICS FOR CONTROL

Where Safety Design Will Pay Off

- Underwing fueling of aircraft is safer, more economical and convenient than overwing fueling (p. 22).
- Better tear-resistance characteristics must be designed into pressurized fuselage (p. 22).
- Fuel location must be segregated, so hazard in crash or fire is minimized (p. 22).
- Aircraft should be designed so that if failure does occur, it happens where the engineer wants it to and can control the degree of damage (p. 22).
- Inspection for incipient fatigue failure must be practicable; replacement of faulty elements must be reasonably easy (p. 23).
- Notches, holes, cut-outs, and other stress-raising conditions must be avoided in elements subjected to fatigue loading (p. 23).
- "Fail-safe" items must be truly fail-safe: no upside-down bolts that fall out if the nut comes off, etc. (p. 24).
- Cockpit must be an efficient office, with controls that are easy to operate and indicators that are easy to read and identify (p. 30).
- Location and types of fire detector units and extinguishers must be studied (p. 30).
- Which way should seats face, and what types of seats shall be used? More study is needed (p. 32).
- Look out for difficult operation, or even freezing, of controls which may result from inadequate clearances and leakage of liquids onto control elements at low temperatures (p. 32).
- Better provisions for ditching and flotation must be built into landplane transports (p. 32).

Littlewood Analyzes Transport Trends—II

Increased Stress on Safe Design Urged

- **Failures cannot always be prevented, so engineers should try to minimize their effects in advance.**
- **Do this by designing 'intended failure points' to limit location, extent of damage, Littlewood says.**

(Last week's excerpt from William Littlewood's Wright Brothers Lecture presented the speaker's discussion of the various factors that influence transport design and specifications. In this second and concluding piece, AVIATION WEEK *gives Littlewood's views on the major problems still facing designers, notably in the fields of safety and jet transport powerplants.)*

If our transport of tomorrow is to be larger than present aircraft, it will accommodate more passengers. So for safety, as well as convenience, careful consideration must be given to the number, size and location of entry-exit doors, as well as to the accommodation of passengers on the ground.

It is amazing that throughout the years, airline passengers have endured the exposure and inconvenience of transition through all kinds of weather between the passenger ramp and the airplane cabin.

► **Ground-Handling Problems**—It now seems that as our airplanes become larger and more difficult to handle and as our passengers continually increase in total number and group sizes, we should give careful thought to . . . stationing the airplane at a convenient ground maneuvering and servicing location, and conveying the passengers and their baggage and cargo to the airplane by suitable ground vehicles. . . .

Mr. Delano of Delano and Aldrich, New York architects, . . . proposed the development of a suitable vehicle for handling passengers between a simplified terminal building and the stationed airplanes. The project was abandoned at that time without, I believe, proper consideration of its imaginative promise. Since then the trends which promoted the thought have become emphasized.

The airplanes are larger and will become increasingly so; the passenger loads have greatly increased; the terminal buildings have grown in size and inconvenience; and ramps have increased in length. Required capital investments and costs have multiplied beyond all reason. The solution now appears to be a revival of the earlier suggestion and the development of a proper vehicle to provide weather protection and conveyance from the ramp to within the airplane and vice versa. . . .

► **Ramp Problems**—We may also hope for design features within our airplane

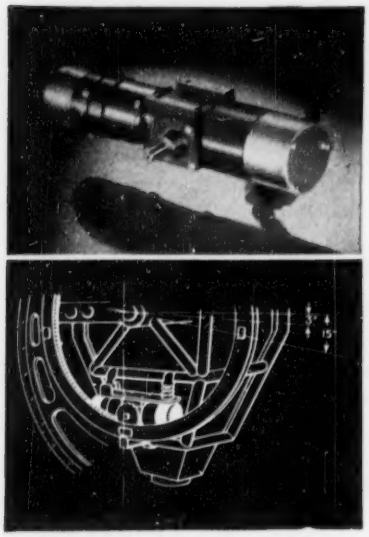
Littlewood's Talk

William Littlewood, vice president-engineering of American Airlines, was selected to deliver the 16th Annual Wright Brothers Lecture in Washington as a result of his intimate connection with the development of the modern American transport aircraft. He is closely linked with the Douglas DC-3 and DC-6 and the Convair 240.

Littlewood's lecture, analyzing transport trends and setting out guideposts for the future, has aroused considerable industry interest and is also being presented before various groups in this country by Otto E. Kirchner, director operational engineering, American Airlines.

In view of the lecture's importance to industry, Aviation Week has undertaken to publish extensive excerpts from it in two parts—the first appeared last week, starting on p. 24. The concluding section starts on this page.

Cameras on Reconnaissance Planes Airborne Actuated



The R-118M6 Rotorac® is used on the Grumman F9F-5P and the Chance Vought F7U-3P to position the photo reconnaissance cameras.

The Airborne actuator is mounted on the camera cradle and its pinion engages a stationary internal gear segment. Five camera positions are obtainable: 3° or 5° and 15° below horizontal on each side, and vertical. The two extremes are controlled by the actuator limit switches; the others by limit switches on the gear segment. Internal switches in the actuator sequence the limit switches to permit the desired relocation.

The R-118M6 is a modification of the Rotorac shown in the I. A. S. Aeronautical Engineering Catalog. We suggest you refer to this publication for data on this and other Airborne actuators.

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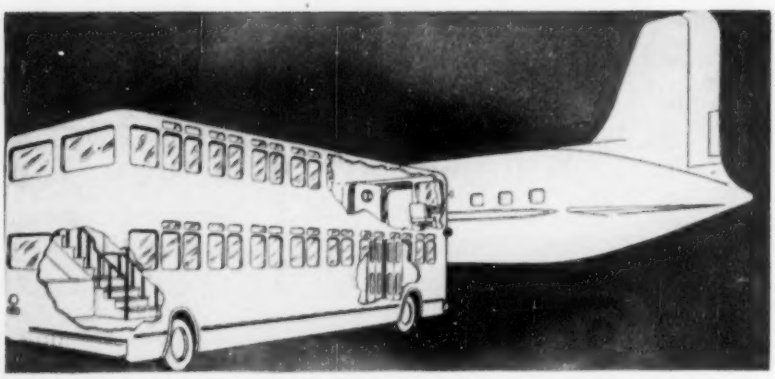

MOBILE GATE HOUSE for safe, weather-protected movement of passengers.

which would greatly simplify the ramp clutter of servicing and cargo-handling equipment. This problem may well be approached by a consideration . . . of as many self-contained built-in features as possible, plus the provision of more fixed installations to provide necessary field services, plus a hoped-for combination and simplification of ground units and the services they perform.

One obviously desirable and easily accessible improvement would be the provision of underwing fueling facilities with its increased convenience, economy and safety.

► **Safety Design**—While we are on the subject of safety, I would like to emphasize some important considerations for the future. First, let us take a look at a lesson we should have learned many years ago. . . .

A DC-2 inflatable, rubber boot of early design . . . started to tear in flight, and the tear progressed unrestrained until the flaying action literally beat the wing skin until large pieces of it tore off in flight as the pilot was seeking an emergency landing place. He barely made it!

Immediately thereafter, in consultation with the manufacturers, there were incorporated in boot designs reinforced strips to stop tears before they had progressed more than a few inches in any direction. Since then, entirely changed and improved materials for boot construction have accomplished the same tear resistance.

Nevertheless, we have failed to design into our pressurized fuselages tear-resistance characteristics to prevent an almost exactly similar progressive failure which can multiply the damage of a small penetration. . . .

Penetration of a piece of propeller blade . . . on leaving the DC-6 fuselage, started a tear which under the effects of pressure instantaneously opened up to remove the top and side skin of the fuselage for an area approximately 10 by 14 feet. The catastrophic possibilities are apparent! Whether or not we will have tear resistance built into our pressurized fuselages is up to the design engineers. The need is evident!

► **Fuel Separation**—Another factor of aircraft design arrangement which should need no emphasis, but which merits much more consideration than it has been given in the past in many designs, is the great safety value of segregated fuel storage locations. . . .

A Convair . . . in pilot training flight was accidently dropped many feet onto a concrete landing strip. In this airplane . . . the fuel is all stored in integral tanks outboard of the engine nacelles—a factor which has shown significant value in a number of instances. . . . Many instances could be cited of this and other airplanes where either segregated fuel location, or complete severance of wings and nacelles with the same net effect, has preserved the fuselage location fire-safe.

Suggestions have been made that in the event additional fuel is required for an airplane, and it cannot be accommodated in the outboard wing panels, it can be provided in tiptanks (which may have quite substantial objections), or in thickened cambered sections of the wing. . . . In any event, substantial structure should be provided to effectively segregate all fuel. . . .

► **Engine Jettison**—This thought leads logically to discussion of a design feature which, to my knowledge, has never been incorporated in any transport aircraft. There have been over the years a substantial number of propeller failures which have resulted in loss of an engine. The engine usually parts somewhere near its mount units or at the fire wall, although it has been known to break in various ways. In doing so, it practically always tears loose gasoline and oil connections, and the strains sometimes transmitted by controls, reach through the fire wall and disrupt fuel tanks, emergency valve operations, junction boxes, etc.

When one suggests improvement in this type of design, one is usually met with one or two statements. First, that an airplane is not designed to come

apart; it is designed to stay together; and second, that it is not good design to weaken any particular part of an installation to promote a failure at that point.

In answer to the first argument, I would say that this type of failure has occurred with sufficient frequency, and while we may hope that it will never occur again, it is the equivalent of sticking your head in the sand to say that design thought should not be given to it, nor design provision made.

In answer to the second argument, I would say that if one conceives a truly sound structure of adequate strength and proceeds to reinforce it in all respects except one, he has automatically created a failure location . . . and has, thereby, done exactly the same thing as designing the structure initially with an intentionally intended failure point. . . .

This is a principle of design which should be given thought in a number of other installations throughout the airplane. It was given thought, for example, in the instance of the CV-240 where the . . . main landing gear fitting attached to the same basic structure as the integral fuel tank, such that a gear collapse or failure of the main fitting might well rupture the fuel tank. On examining this detail critically, the design was changed and the landing gear was entirely divorced from the fuel tank structure with unquestioned improvement in safety.

▶ **Fatigue Effects**—We have long been concerned about the cumulative effects of fatigue loading of aircraft structures. Investigations undertaken sometime ago reveal one very encouraging characteristic of such failures in usual type aircraft structures—namely, that development of a fatigue crack is a process which proceeds initially at a slow rate such that the first 20% of the failure may require as much time as the last 80%. . . .

There is normally plenty of time, particularly in a redundant structure, to determine the existence of incipient fatigue failures. Such, however, is only of value if the structure is capable of ready access for inspection. This is a design "must," which has frequently been neglected.

A corollary to this principle is, of course, that the structural elements subjected to fatigue loading should be so designed that in the event of crack development they can be replaced with reasonable readiness.

These comments apply to all critical structures in the aircraft and to all major fittings subjected to fatigue loading. . . . All such structures and fittings should avoid improper stress-raising conditions such as notches, holes, sharp cut-outs, etc.

It has been quite shocking to find the existence of such design details in

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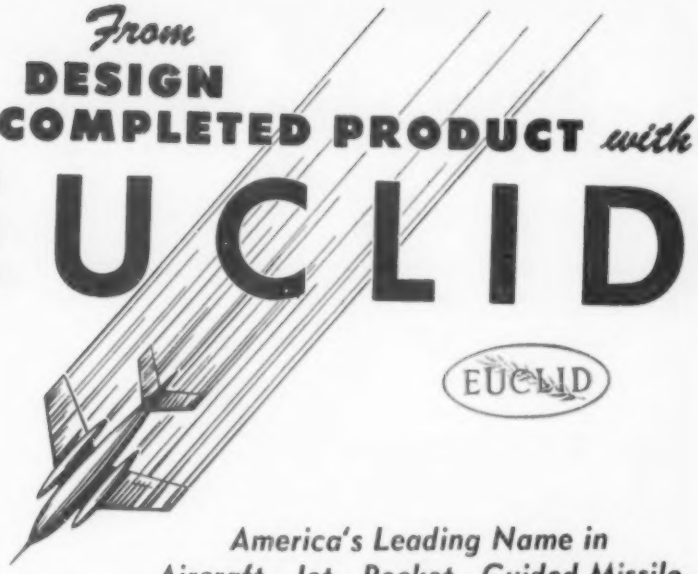

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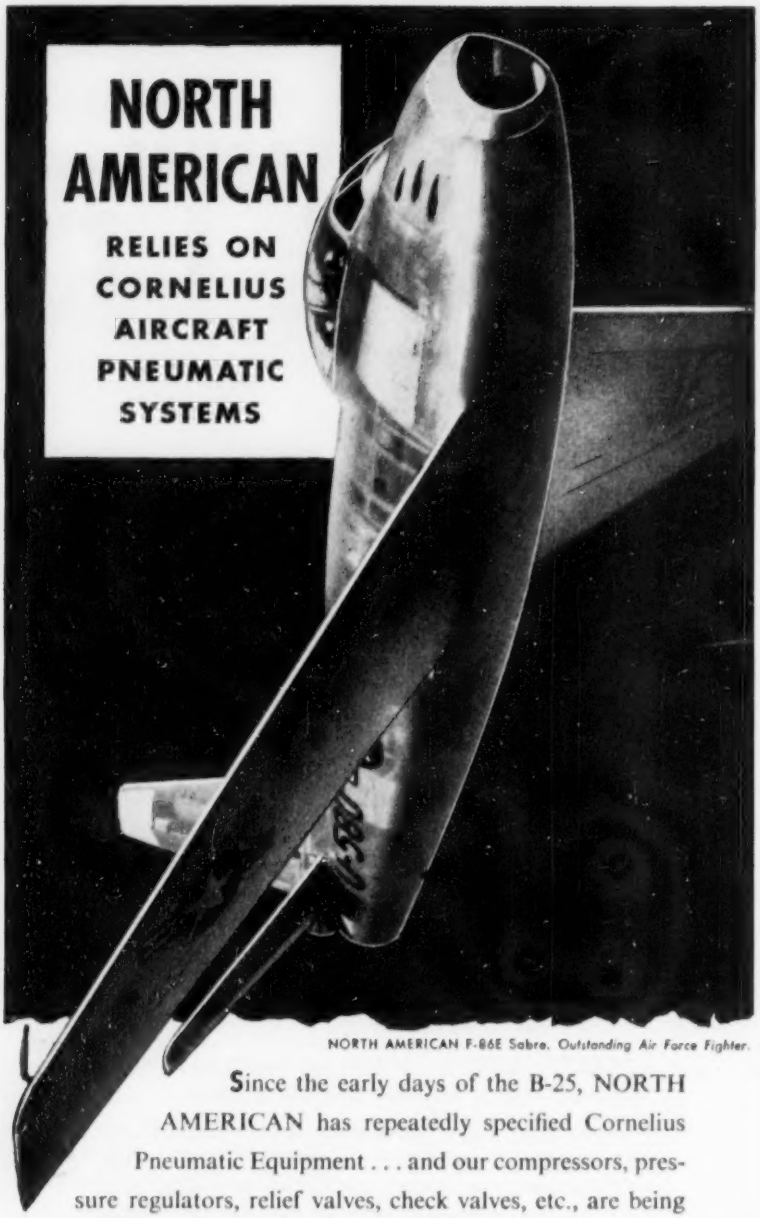

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critical structures. Experiences in the fatigue field have certainly emphasized the value of multiple and redundant structures to protect against the cumulative effects of fatigue.

► **Detail Design**—Another category of design deficiencies which has been too common in transport aircraft, concerns the inadequacy of mechanical design details, such as bearings, gears, links, cams, and keyed and splined assemblies, which were not adequately designed to withstand reasonable wear without early failure or becoming non-functional. . . .

Any design detail, the failure of which prevents the system functioning or causes it to malfunction, cannot be tolerated in a critically important system. An airplane is such a complex combination of aerodynamic, structural, mechanical, electrical, hydraulic and materials engineering, etc., that the over-all product frequently suffers from deficiencies in one of the categories, and not in fundamental aeronautics.

There have been too many instances in transport design of details which were not "fail-safe"—upside down bolts which fell out of place in critical locations when a nut accidentally came off, hinges which were located on the wrong side of openable inspection doors or leading edge covers, chair attachment fittings which pulled out of their sockets with a minor distortion of the chair structure. . . .

► **Safety Locks**—Wherever possible, assembly units, which for safety must not come apart, should be made with built-in safety locks and a minimum of loose parts which can be omitted in servicing.

Good interchangeability should be provided throughout the airplane for all replaceable units to simplify maintenance operations and to guarantee satisfactory functioning or replacement. A minimum of simple tools should be required for the performance of all frequently required maintenance operations and replacements.

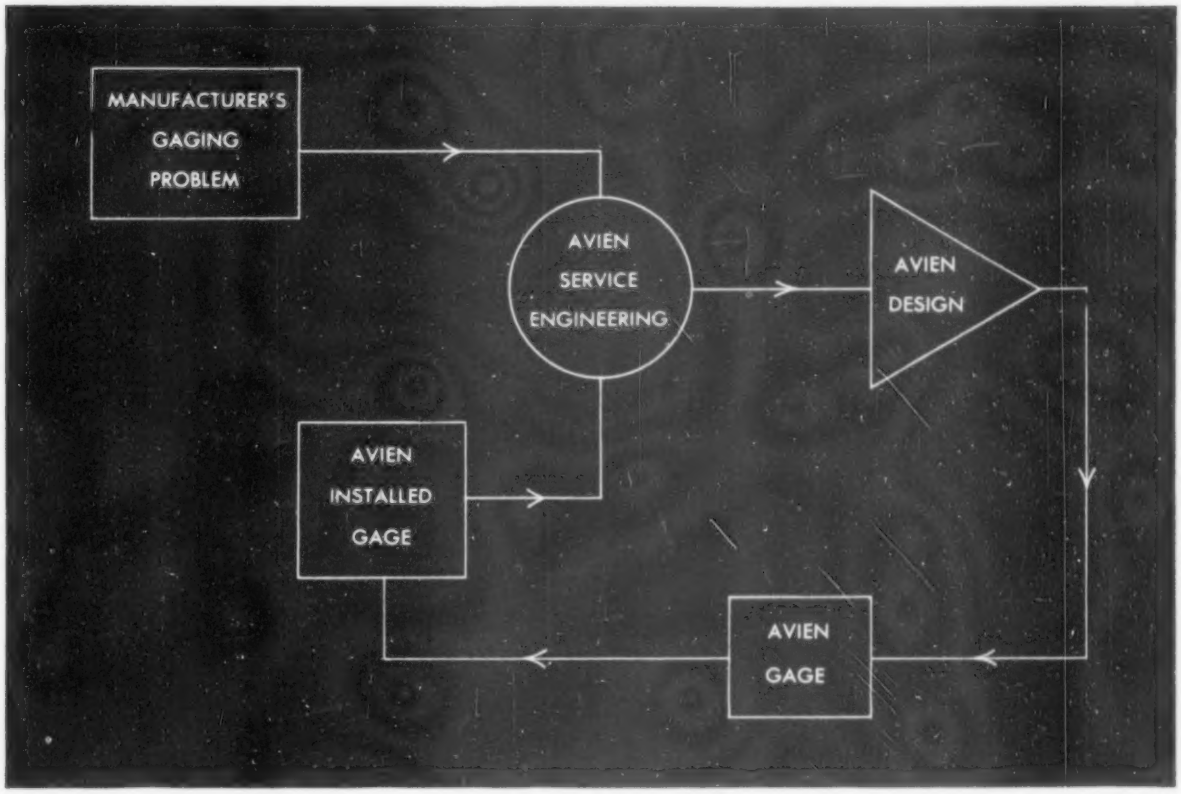
One detail frequently disregarded is the essentiality of easily recognizable safety wire to be used in service to differentiate between those things safetied to prevent accidental use and those safetied to prevent breaking loose.

In the one case, you require a high degree of permanence, and in the other, you desire only a temporary restraint.

The use of too-strong safety wire for an emergency operating handle could easily prevent its functioning when required. It has been done!

► **Simplification**—I would also urge all design engineers, and in fact all aircraft manufacturers, to be on the offensive in the interest of simplification. It is axiomatic that there are many more people who want to add things to airplanes than to take them off.

Starting with the president and board



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Second, we're going to keep on adding the best engineers in the business. If you think you're one of them, send your detailed resume to Department E.

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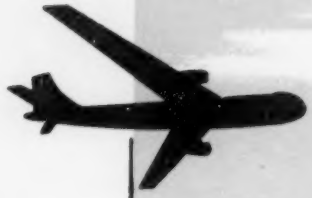
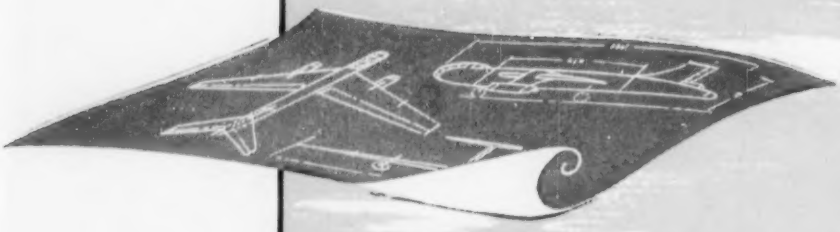


MODERN PLANES DEMAND GOOD CONTROL CABLE



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of directors and proceeding on down through the sales and public relations department, the operations department, the pilots, passenger and cargo service divisions, the maintenance department, and the airline engineering department itself, there is a continuous development of good ideas, each suggesting the addition of some added complexity, often meritorious but frequently unnecessary and always meriting question.

No one apparently is devoted to taking things off. The ultimate effects on weight, economy and safety are evident. . . .

I would like to emphasize the situation with respect to electronics. A DC-6B airplane has among its electronic equipment two HF radio transmitter-receivers, one VHF transmitter-receiver, one automatic DF, one glide slope receiver, one radio altimeter, one autopilot possible with its black box ILS coupler, one marker beacon receiver, two omni-range receivers, one intercommunication system.

Other aircraft of the same type may have in addition a loran receiver, electronic propeller controls for governing and synchronizing, electrical supercharger controls for pressurization superchargers or for engine boost; and if we look to the future, we will probably have electrically operated fuel regulators, more complex engine-propeller controls, and radar equipment, etc.

▶ **Avionic Complexity**—A DC-6B as now equipped has at least 350 vacuum tubes. The average life of a vacuum tube in service is estimated to be 5,000 hours. So, you can see the extreme vulnerability to electrical trouble and expense of modern and future transport airplanes.

We do have now in development and available to a limited degree, transistors and associated units which are expected to increase reliability . . . by many times —currently estimated as 15 times and ultimately 100 times. They will . . . save weight and space and promote economy. It is hoped they will greatly reduce the cooling problems of high-power electronic equipment. . . .

The program of miniaturization includes development of transistors, capacitors, resistors and dielectrics. . . . It will require a long time to find its way into practical benefits of weight- and space-saving in the aircraft.

The units must be developed to be satisfactory functional types after which they must be applied to commercial electronic units and thereafter installed in the aircraft with significant changes of location and installation. . . .

Miniaturization also involves the application of midget principle to instrumentation and other functional units where size and weight can be reduced without affecting efficiency or reliability. This whole program is a highly bene-

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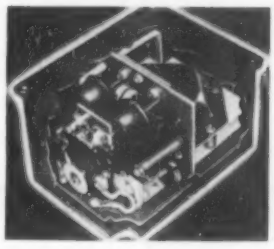
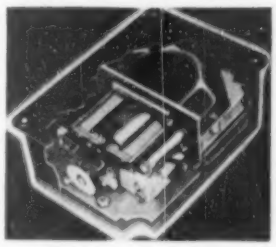
high interrupting capacity cutouts serve leading airlines the world over



Hartman A-750D 400-ampere 28-volt reverse current cutout.

Hartman A-751D 400-ampere 28-volt contactor for aircraft with panelized systems.



● Thousands of operating cycles at rated capacity under conditions of wide ambient temperatures, humidity, dust, altitude, vibration, acceleration, shock. Add to this the possibility of 28-volt generators producing up to 175 volts if a failure applies full field at high rpm as on takeoff. These rugged conditions demand the utmost in interrupting capacity.

That's why leading airlines use Hartman high interrupting capacity switches in their Convair 340 and Douglas DC-6B and DC-7 aircraft. For the new Hartman reverse current cutouts and contactors have an *interrupting capacity greatly in excess of all requirements from sea level to 50,000 feet.*

Dependability and safety of these units is typical of many other Hartman aircraft control devices. So if you have an AC or DC control problem, turn it over to Hartman for speedy solution. A-5706

Convair 340

Douglas DC-6B

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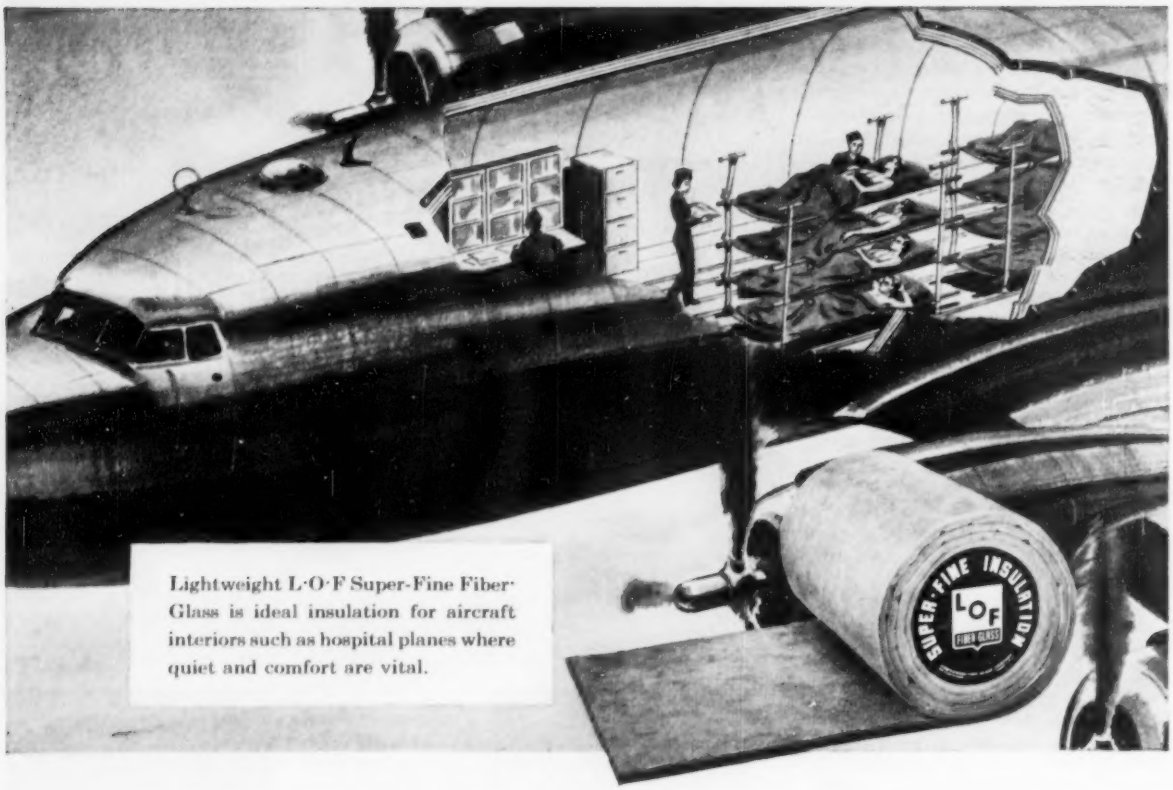

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ficial one headed in the right direction. . . .

▶**New Antennas**—In the past we have tried to develop nice, clean, aerodynamically efficient transport airplanes, and have usually ended up by plastering them all over with antenna, radomes and gadgets until we had paid a very significant penalty in performance.

Dr. Harald Schutz of the Glenn L. Martin Co. recently mentioned among future developments in the antenna field:

- **All flush-mounted antenna.**
- **Novel radiation devices** such as corrugated surfaces and dielectric slabs.
- **The use, as radiation sources,** of apertures such as jet intakes.
- **The use of conductive fluids** in plastic canopies.
- **The use of ionized exhaust** gases as radiators.

Hopefully we will have no external protuberances on our future aircraft except those required for the basic aerodynamic or thrust producing properties of the vehicle. . . .

▶**Approach Considerations**—It seems obvious that the faster airplanes and higher rates of descent to be employed in the future will allow the pilot less time to trim and adjust his airplane for touch-down.

He must start to prepare for his landing further back than is currently the case, and the operation would seem to require a relatively long, straight-in approach. . . .

We must visualize a long period of time during which aircraft of conventional types will commingle with an increasing number of highspeed transports in traffic patterns and airport use. These problems directly affect airport utilization and traffic control techniques, both as to efficiency and safety.

It is also apparent that the work now underway to promote the precision of day and night ceiling and visibility reporting must be carried forward to provide adequate information during that most critical regime of all weather air transport operation.

We are far from a promise or expectation of full instrument landings, and must recognize the exacting requirements of the transition period from instrument approach to final visual contact. . . .

▶**More on Safety**—I would like to stress a few other safety problems associated with the turbo type powerplant.

One, of course, is the possibility of mechanical failure, particularly serious with turbine wheels. . . . This problem can be approached from the material and design angle providing adequate strength, reinforced by cooling, and satisfactory inspection methods, to hopefully insure against failure.

Another approach is to admit that failures may occur from time to time

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of accident-free helicopter air mail flying with

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An extraordinary record of dependable operation has been achieved by Helicopter Air Service, Inc. of Chicago, which carries air mail between Chicago and 50 suburbs. Between August 20, 1949, and December 31, 1952, H.A.S. completed 20,200 hours of accident-free flight with its Franklin-powered Bell helicopters. It has flown 1,085,000 miles, carried 9.5 million pounds of mail, with a performance factor of 95.7%, *without a single engine failure.*

On one day alone, December 19, 1952, H.A.S. completed 72 shuttle trips, carrying 22,679 lbs. of mail between the Chicago Post Office roof and Midway Airport, plus 16 suburban trips with 6,271 lbs. of mail.

While these records have probably never been duplicated in the history of helicopter flying, thousands of other military and civilian Bell, Sikorsky and Hiller helicopters are proving in daily service throughout the world that Power by Franklin means dependable, trouble-free, economical service.

The great majority of all helicopters flying today have Franklin engines.

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and to protect against their potentially serious results by powerplant arrangement and location, or by protective shielding.

Another serious turbo safety problem is that which involves continued rotation and the existence of extensive internal hot parts in the event of a crash landing. Possible rupture of fuel tanks or lines, even with—or perhaps, particularly with—low-volatility fuel, demands very adequate fire protection and possibly rapid cooling methods.

We may also have problems associated with the altitude limits of combustion and with re-lighting in case of jet extinguishment. . . . There is the susceptibility of jet type engines to serious internal damage from intake ice formations and from the ingestion of foreign objects.

It is also essential that the acceleration of jet engines in case of required go-around on landing be made rapid and dependable . . . without invoking surge and without having to retain a too-high percentage of rpm. and thrust on approach, with its aggravation of the landing deceleration problem.

▶ **Vibration Failures**—A safety problem associated with noise, or more particularly with the prevalence of structural vibrations associated with jet exhaust, is the increasing frequency of structural failures due to fatigue from that cause.

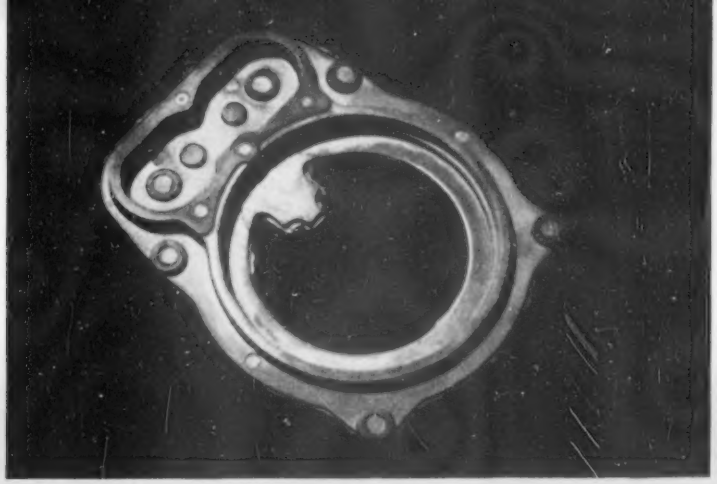
The areas most commonly affected are those directly subjected to the jet flow impulses; however, there has been an increasing indication of other critical failures attributable to high-frequency vibrations originating from the jet characteristics. It is to be hoped that the eventual solutions will decrease or eliminate the noise and structural failures, and will promote thrust efficiency.

▶ **Cockpit Engineering**—I cannot adequately emphasize the importance of better cockpit engineering. . . .

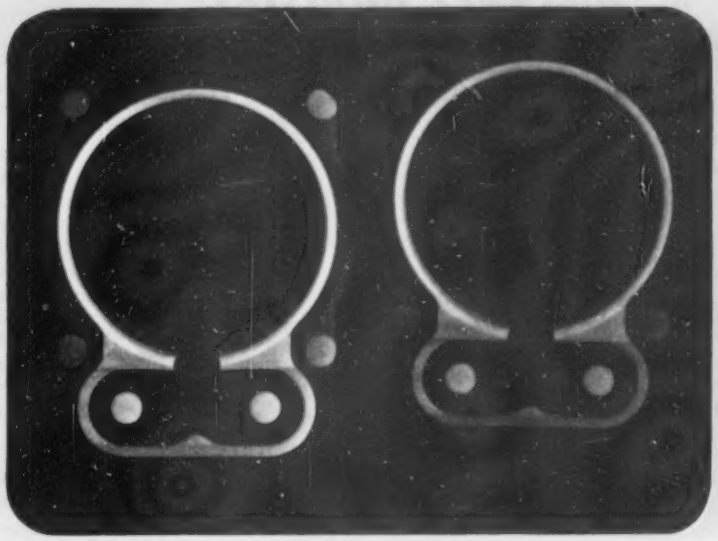
The cockpit must become the center of relaxed, efficient functioning. To this end, it must be adequately roomy and comfortable, well lighted, well heated, well ventilated, provided with fully adequate vision, must have a minimum but adequate number of easily operable controls, and readily identifiable and readable indications. The cockpit must be an efficient office. . . .

▶ **Fire Warning**—We must emphasize some rather obvious needs in the improvement of air transport fire protection. . . . Many powerplant fires have not been detected by the units installed for that purpose.

In almost 50% of the cases with which I am familiar, attention was called to the existence of danger by passengers, cabin or cockpit crew, or engine malfunctioning, rather than by operation of the fire-warning equipment. This has been due to improper location of detectors, deficient mount-



This casting must accept responsibility



Radiograph of flight instrument part

—RADIOGRAPHY SAYS IT CAN

WHERE this casting goes, strains are measured in G's, speeds in machs, and altitudes in tens of thousands of feet. And the instrument of which it's a part must be sturdy and dependable to help guard the safety of a costly craft and human life.

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ing of detectors on materials which failed easily or burned away before detector operation, and sometimes by destruction of detector circuits by fire before the warning was given.

There is great need for determination by actual airflow tests, of the proper location of detector units and extinguisher outlets under all continuous operating conditions, including the opening and closing of any shutters which may affect airflow in the compartment under consideration.

► **System Integrity**—Preservation of the integrity of systems—particularly those on which we must rely in emergency—seems obvious. Yet all too often one failure induces another, sometimes in an unrelated but essential safety system, and sets up the equivalent of a chain reaction leading to catastrophe. . . .

There is also need for the determination and elimination from all passenger- or crew-occupied areas, or areas susceptible to fumes, of the use of materials which produce toxic compounds in the event of fire.

It is believed that the explosive-type fire-extinguisher unit patterned after the tank explosion-suspression devices developed in England might produce a very effective and lightweight engine compartment-type extinguisher to cope with the unfavorable airflow conditions existing. . . .

► **Which Way Seats?**—One of the currently popular subjects for discussion in the safety field is whether or not seats should be faced forward, backward or sideways.

Mr. Hugh DeHaven has, I believe, cryptically stated the uncertainties of the problem when he asks the question, "What types of rearward facing seats are how much safer than what types of forward facing seats?" It is obvious that turning our existing seats to the rear would provide no more, if as much, safety than at present.

We have not yet analyzed exactly what it takes to determine the relative safety of the several seat directions. Dynamic load studies are required.

We have previously suggested that the approach to the problem of accident survival should be based on the known loads which the human body, properly supported, can tolerate. This thinking carried along in the design of seats to face in any direction, can, I believe, develop equivalent safety in all directions and eliminate this rather futile debate from our list. I would suggest that any action or regulation which limits the direction of seat facing in transport aircraft would be premature and all-advised.

► **Frozen Controls**—We still have instances of freezing of controls or of difficult operation due to inadequacies in design with respect to the effects of low temperature.

Inadequate clearances in such systems in the presence of small amounts of moisture can result in locking from freezing.

Unnoted leakages of liquids onto control elements can, when combined with low temperatures, cause the same effect.

Differential expansion of materials can cause trouble when combined with inadequate running clearances. . . .

I would like to mention the importance of designing into our land planes . . . much more adequate and specific provisions for flotation and ditching than have prevailed in the past. Reliance on empty fuel tanks is, in my opinion, insufficient, as is the assumption that the hull, wing or tank structures may not be substantially damaged in a ditching.

► **Jet Problems**—There are a whole series of jet powerplant problems yet to be resolved. . . .

One is the extremely adverse effects of high temperature and humidity on jet output. The question involved is, of course, one of temperature accountability.

It would appear that the objective to be sought would be the achievement of a principle of temperature accountability which would produce the same

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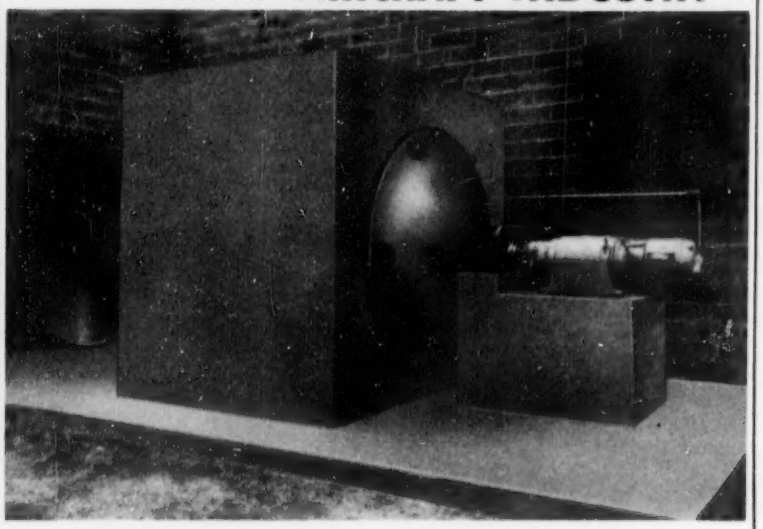

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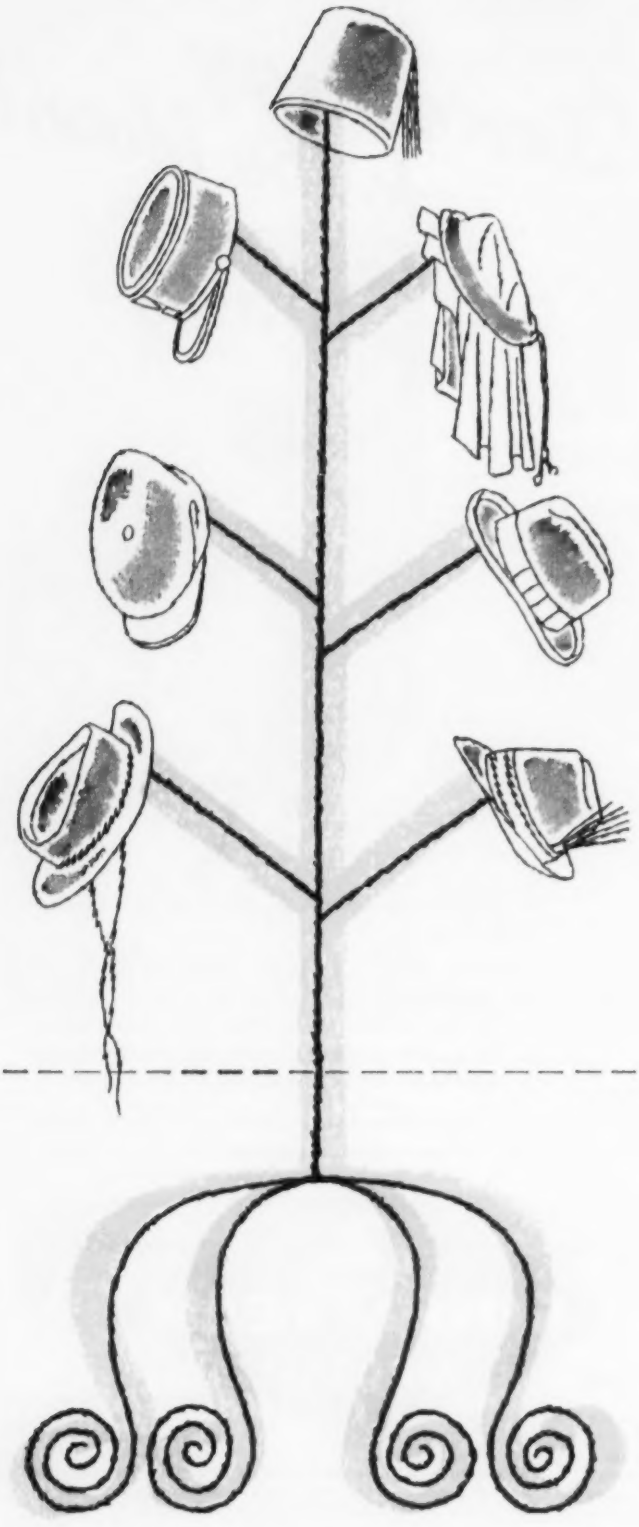

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adequacy of reserve performance encompassed in the present 50% temperature accountability with reciprocating engines. Full temperature accountability would, of course, maintain under all temperature conditions the full reserves for ideal conditions stated in the Civil Air Regulations, including the normal 50-ft. obstacle clearance.

At the other end of the list, no temperature accountability would normally result in the loss of the entire 50-ft. margin at a temperature of approximately 85F. Fifty percent accountability retains a percentage of the total margin all the way to 120F. This is believed to be a very satisfactory and sensible compromise, and its retention in principle is recommended for future jet operations.

▶ **Jet Fuel Consumption**—Another important jet efficiency problem is that associated with specific fuel consumptions. It appears now that we can hope . . . for fuel consumptions . . . approximately twice those to be anticipated . . . with improved turboprop powerplants, or with the latest reciprocating compound engines. We are far from achieving such jet consumption values at the present time.

These figures are not directly comparable, but are indicative of a most serious jet range and economy problem. Consumption rates are related to intake losses and ram recovery, compressor ratios and efficiencies, combustion efficiency, turbine intake temperature and efficiency, mechanical efficiencies, and jet outlet efficiency, configuration and manipulation. . . .

We may well be faced with the same problems as in the past in reconciling the installed results with those determined in test stand operation!

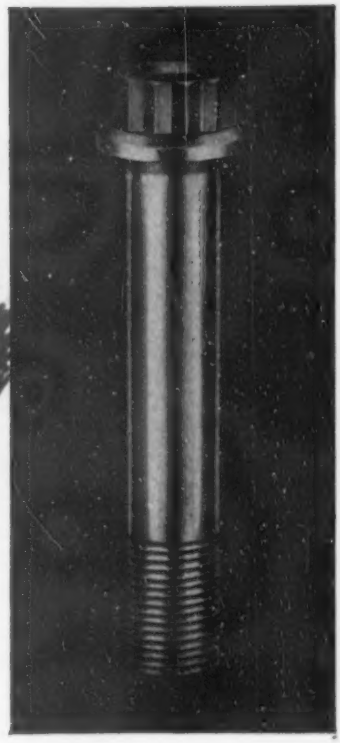
We also look forward hopefully to substantial reduction in indicated powerplant first costs and to great improvements in engine overhaul periods and attendant costs. . . .

▶ **Traffic Problems**—There are also efficiency problems associated with the introduction of highspeed transports into the current airport air traffic and ground handling problems. . . . The jet does not have the flexibility of air or ground handling that is now available with conventional aircraft, or that will be common to the turboprop type.

We must also examine closely the significance and value of the so called de-rating of jet powerplants—that is, the determination of proper commercial transport operating ratings as compared with the approved military figures. . . .

Such de-rating is inevitably accompanied by decreased thrust available and increased specific powerplant weights. The degree of compromise necessary and desirable is yet to be determined. . . .

▶ **Powerplant Control**—We must also



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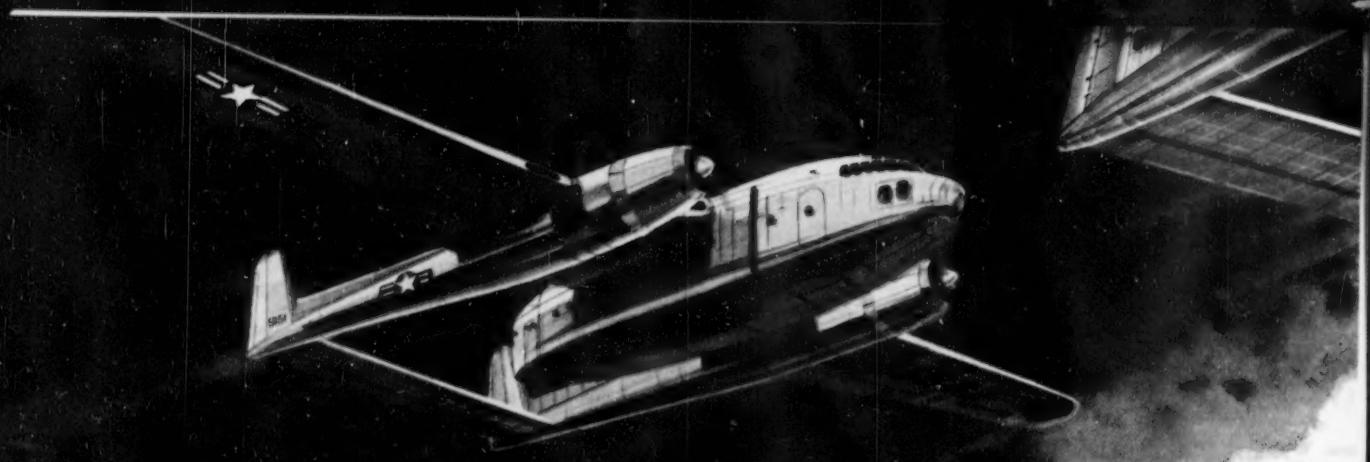

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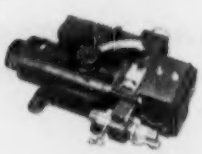

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determine and evaluate the effects of nozzle shape and adjustment, and techniques of powerplant operation affecting cruising efficiency.

We are faced with a serious problem in the relatively high fuel consumptions for taxiing operations. And here we meet some airport problems. Consideration must be given to possible damage to runways and run-up areas due to blast, heat and fuel spillage. These effects are influenced by the character and materials of pavement construction, and by the proximity and direction of the jet exhausts relative to the ground. Augmented takeoffs would greatly aggravate these problems.

Taxi strips and holding areas must be designed to permit high taxiing speeds to conserve fuel, and to minimize taxiing distances. Aprons and airplane loading areas must give protection against blast and heat to structures, equipment and personnel, and must adequately control objectionable noise. . . .

▶**Fuel Considerations**—We must examine very closely the nature and costs of fuels to be used in commercial operations. Current jet fuel specifications are based largely on maximum availability with satisfactory characteristics, which may or may not produce the same answer as a satisfactory fuel of minimum cost.

Turbo engines can be developed to operate satisfactorily and efficiently on a wide variety of fuels. Fuel costs are such a large percentage of jet operations that this economic factor must not be neglected.

An important consideration in realistic economic studies is the adequacy of assumptions of operational fuel reserves. A tentative suggestion which has been discussed with some of the aircraft and powerplant manufacturers is to assume a 45-min. weather hold at 20,000 ft. at destination, followed by a descent to attempted landing, then a climb-out to 20,000 ft., and a cruise to alternate of 300 miles, followed by an additional hold of 45 min. and descent to landing.

This would appear to be a fairly drastic reserve requirement, but is not incompatible with operational requirements under extremely adverse weather conditions.

It appears that with axial-flow engines of modern design, there is relatively little difference in the fuel consumption ratios of four- and two-engine holding, and—quite differently from Comet-Ghost experience—no particular penalty is paid.

▶**Internal Conditions**—It is to be hoped that research may disclose satisfactory methods for determining the existence of internal conditions which are signs of progressive deterioration. . . .

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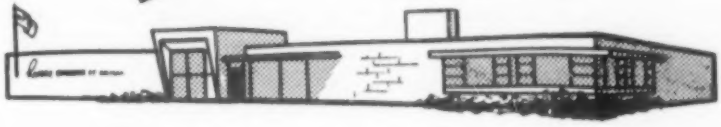

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jet economics if methods can be determined for detecting and forestalling serious mechanical troubles, serving also perhaps as a most logical basis for overhaul.

Much additional information must be obtained to establish the most efficient jet operating altitudes. It seems a reasonable conclusion . . . that the probable altitude range of efficient jet transport operations will lie between 30,000 and 55,000 ft.

Once 30,000-ft. operating altitude is exceeded—and exceed it we must for jet operations—the problems are largely ones of degree and not of nature. We must have absolute assurance of no decompression failures.

▶**Eight Miles Up**—Until recently much thought was given to anticipated commercial jet operations to approximately 40,000 ft., but more recent information has indicated that this may be a somewhat undesirable altitude . . . with prevalent turbulence and high wind conditions.

It would appear, therefore, that jet transport operations may often be conducted at altitudes somewhat in excess of this, and that for the retention of a reasonable bracket of efficiency factors, they should not frequently be too much lower, although 30,000 ft. may often prove necessary and desirable.

It has also become increasingly apparent that at the higher altitudes jet stream velocities must be reckoned with, and avoided if they are in an unfavorable direction, and that the boundaries of such jet streams must be traversed in the shortest time to minimize the undesirable turbulence.

▶**Past to Future**—We have tried to show that from the diversified air transport equipment of 25 years ago, there emerged a simple and consistent type generally common to the air transportation activities of this country and of the world, and varying principally in sizes, capacities, arrangements and performances.

We are now at, or by British standards, just over the threshold of a revolutionary change in air transport propulsion. There are some significant changes indicated in the airplanes, themselves, involving refinements of aerodynamic cleanness and form, and substantial extensions in speed, altitude and associated performances, equipments and requirements.

For many applications of the indefinite future—notably the local or short range operating field—drastic changes in existing characteristics do not appear to be necessary or desirable. There will, in any event, be a protracted transition period during which the very substantial changeover will be effected.

We must never forget that effective speed is of the essence of air travel, and in spite of possible economic problems and technical difficulties, the availability of that speed with adequate safety, dependability and comfort will find extensive use in the essential advances of this country and of the world.

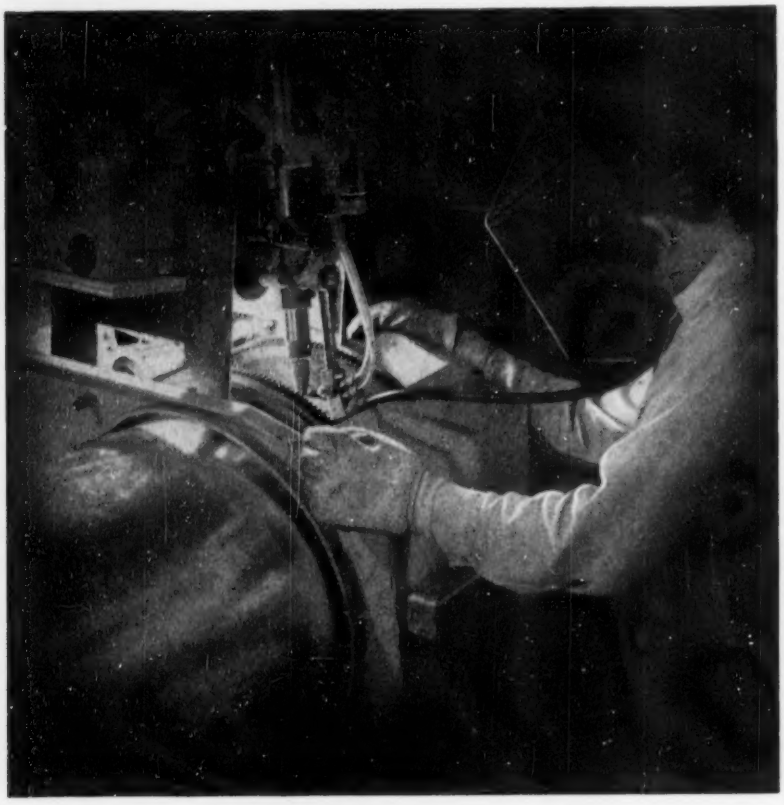
▶**British Lead**—It must be frankly admitted that as of today . . . the British have a substantial lead on us in the accomplishment of a limited area of highspeed transportation. This, I believe, is due largely to the existence of an adopted and implemented program of British aviation expansion, both military and civil.

In 1918, Lord Northcliffe, then Chairman of the British Civil Air Transport Committee, stated: "Cost what it may, this country must lead the world in civil aerial transport." For a number of years, the British led down that path.

However, starting in 1927, and for 20 years thereafter, American enterprise acquired and retained the leadership in both quantity and quality of air transport.

The reaffirmed and implemented British policy of the days immediately following the second World War, however, certainly threatens to transfer that leadership in quality of performance, if not in quantity.

With the technical facilities for research and development and the



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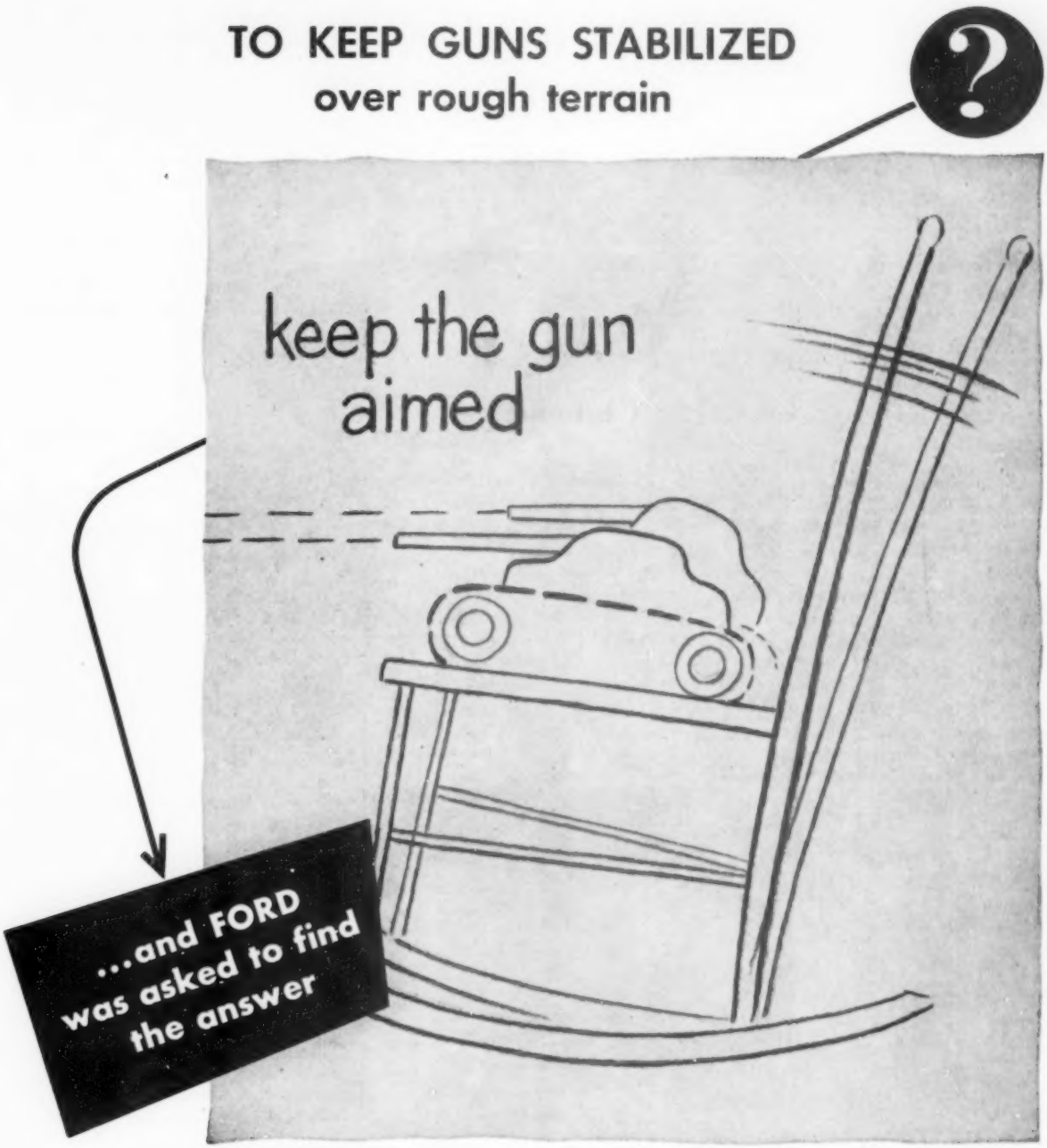

Over open area a tank pitches and heaves like a rocking chair . . . but regardless of the bumps . . . ditches . . . hills . . . the guns keep pointing at the target while the tank is moving. Ford Instrument Company played a vital role in designing and manufacturing a stabilizer unit for the tank's gun fire control system.

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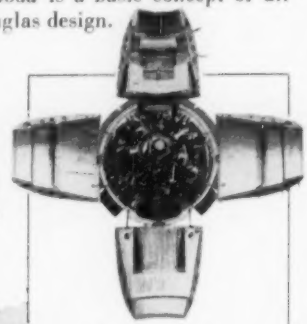
Performance of the Globemaster in action is another example of Douglas leadership in aviation. *Faster and farther with a greater payload* is a basic concept of all Douglas design.



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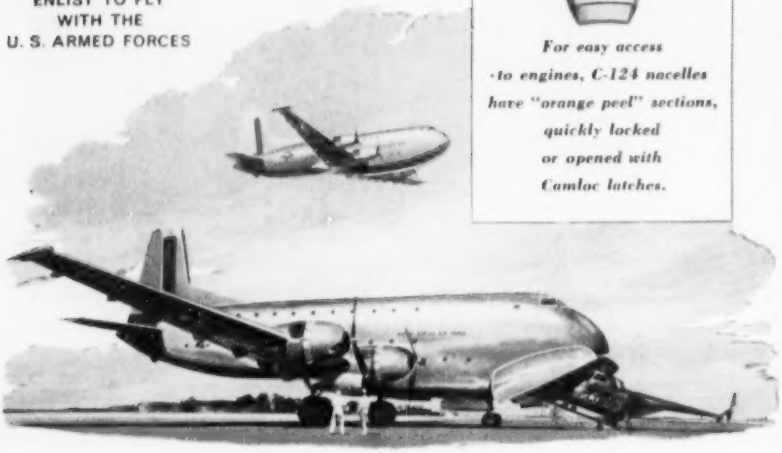

Depend on *DOUGLAS* First in Aviation

knowledge and capacity at our command, we could easily re-establish our pre-eminence in air transportation.

However, I am bold to state that before that is accomplished, there must be some evidence of reassertion of the pioneering spirit which has always characterized American industry, and which has now apparently deserted the plans and activities of the American air transport operating and manufacturing groups.

We do not want in America the government domination of the air transport manufacturing or operating industries which prevails in Great Britain, but we do want some semblance of the results that have been obtained by that system.

There must, I believe, be a basic change in the attitude of our aircraft manufacturing industry toward the desirability and practicability of producing highspeed transports.

I do not hesitate to include in this the powerplant manufacturers and the . . . accessory and equipment producers, whose products are essential to the venture.

Lacking a controlling national program in this field—and we would not wish to have any such—we must rely on the courageous leadership of private enterprise to stimulate action.

▶**Joint Action Needed**—I would say that there is little likelihood of selling highspeed transports in the design and development of which prospective customers have had no voice. We have seen today that the graveyard is replete with such projects.

Nor is there much likelihood of selling units, either powerplant or airframe, which threaten to cost anything like the numbers which have been recently quoted in the American press. The figures just do not smack of reality, nor of any real desire to do the job, nor indicate any willingness to take a reasonable American industrial risk in the doing of it.

I would hate to think where we would be today if that spirit had characterized the 25 years of air transport which have just passed. It is my fear that unless there is a substantial change in our attitudes and accomplishments, the manufacture of highspeed air transports will depart from these American shores just as did the merchant marine of the past. It can happen again!

My final exhortation, then, is to reappraise the situation honestly, evaluate the risks we can afford to take, and the risks we cannot afford not to take. We of the air transport industry admit our concurrent responsibility, and would be happy to join with the designers and manufacturers in bringing about the early availability of the world's best high-performance transport airplanes.

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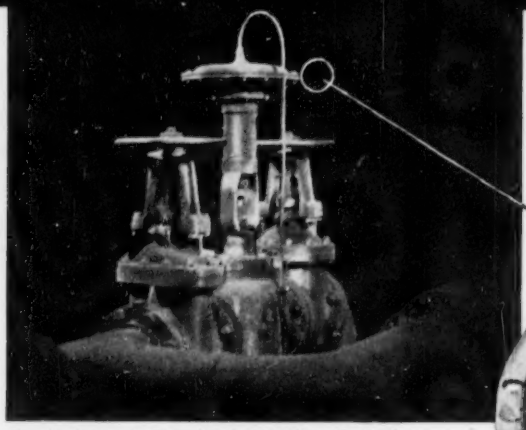

The diaphragm in this valve that regulates the intake to a boiler feedwater storage tank, is in almost constant motion 24 hours a day at temperatures well above 100°F. Successive synthetic rubber diaphragms lasted 7, 11 and 13 months respectively. That's unsatisfactory performance in a power house supplying energy to a large chemical plant. So they tried a Silastic coated glass diaphragm. Recently inspected after more than 78 months of service, the Silastic diaphragm was still soft and flexible; showed little wear; appeared serviceable for many more months.

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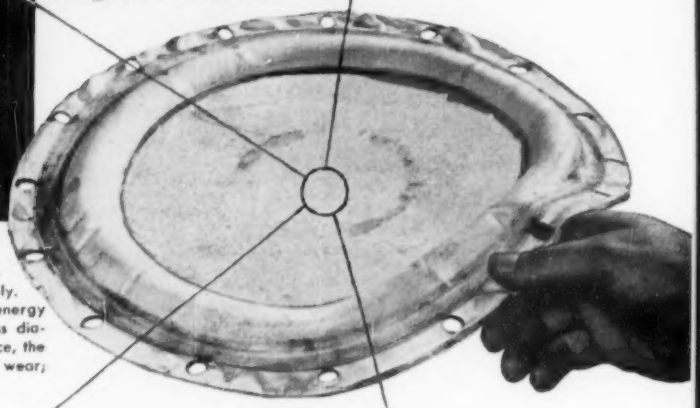

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IAS Summaries

Papers on rocket propulsion and aerodynamics presented at the 21st annual meeting of the Institute of the Aeronautical Sciences are summarized on the following pages.

The summaries continue a series begun two weeks ago on the IAS meeting. Others will be printed in an early issue.

Rocket Propulsion

Joint Session in cooperation with the American Rocket Society

▶ **The Effect of Fluid Properties on the Spray Formed by Two Impinging Jets.** M. F. Heidmann and R. J. Priem, Lewis Flight Propulsion Lab., NACA.

This discussion shows the effect of fluid properties on the spray formed by two impinging jets. Fluids used in this investigation were glycerol-water mixtures and hydrocarbon oils.

It was found that the length of the spray before breakup into droplets was dependent on fluid properties but that the maximum width of the spray was unaffected by the fluid properties. The most important effect of the fluid was found to be on the clearness or distinction of the spray.

▶ **Measurements in Rocket Engine Testing.** Howland B. Jones, Jr., Reaction Motors, Inc.

This paper covers the application of conventional instrumentation to the specialized field of rocket-engine testing with special emphasis on the less conventional instruments, and quick analysis of data obtained therefrom. Some devices described are a multi-channel pressure recording unit operating into a single cathode-ray tube, a combination of a 4-gun cathode-ray oscillograph and tape recorder, and use of a conventional sonic analyzer with associated equipment.

▶ **Earth Scanning Techniques for Orbital Rocket Vehicles.** Kurt R. Stehling, Rocket Research Engineer, Bell Aircraft Corp.

A desirable function of a satellite or other high-altitude rocket vehicle is that of intelligence—i.e., the gathering and transmission of information about the earth's surface.

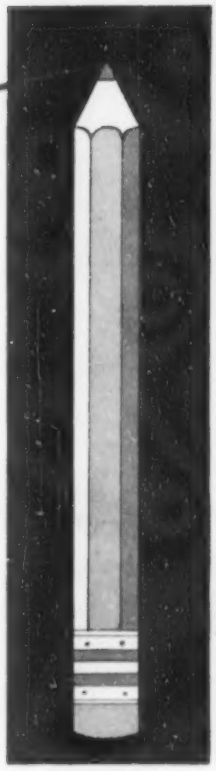
Two possible methods of viewing the surface are described, assuming the restricted payload and space of a minimum satellite vehicle; an optical image-converter system and microwave radar. An altitude of 500 mi., orbital velocity of 5 mi. per sec., and hypothetical target of 600 yd. diameter are assumed.

It is shown that the net resolving power of the optical-video system is limited by the image converter and available transmission bandwidth; the effects of atmosphere, meteorological conditions, and albedo are also discussed.

The approximate resolving power, weight, and power and space requirements of a radar unit are outlined.

It is believed that, with the present state of radar scanning, the optical system has the weight and resolving power advantage, but

Know How



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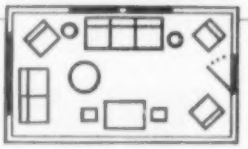

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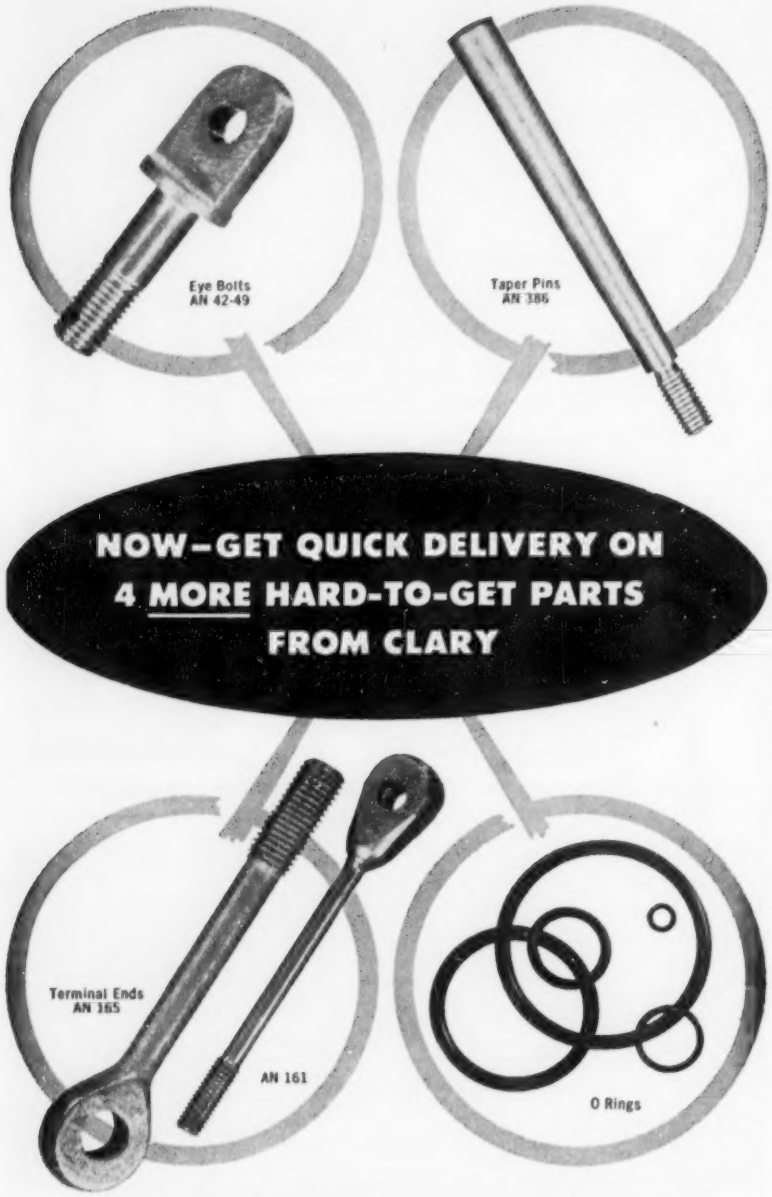

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its daylight dependence and attenuation limitations are severe enough to indicate questionable feasibility. Furthermore, the low resolving power of a radar unit from the 500-mi. altitude and attenuation losses limit the usefulness of this system.

It is generally concluded that the discussed earth-scanning techniques for the location of the indicated target size may not be practical for a small instrumented orbital vehicle. The substitution of a human observer for some of the instrumentation might result in a weight-saving.

Aerodynamics

▶ **Turbulence in Supersonic Flow.** Leslie S. G. Kovasznay, Assoc. Prof., Dept of Aeronautics, The Johns Hopkins University.

There is a rather fundamental conceptual problem for turbulence in a compressive flow. The number of physical quantities that fluctuate is greater than in an incompressible flow, since not only velocity and pressure but also density and temperature may fluctuate.

With appropriate grouping of the fluctuations, one can define three distinct "modes": the temperature spottiness, turbulent velocity fluctuations (zero divergence), and sound waves (zero curl).

The hot-wire anemometer responds to all three modes, although in a different manner to each one. By operating the hot wire at different temperatures a "fluctuation diagram" can be obtained and the different modes of fluctuations identified. Composite cases can also be interpreted by the fluctuation diagram.

Measurements in the free stream of a supersonic windtunnel and in a supersonic turbulent boundary layer were carried out and detailed fluctuation diagrams obtained.

The interpretation of the results indicated that all three "modes" are significant in the actual flow field.

▶ **Review of Published Data on the Effect of Roughness on Transition from Laminar to Turbulent Flow.** Hugh L. Dryden, Director, NACA.

A review is presented of the published data on the effect of roughness on transition from laminar to turbulent flow, in which an attempt is made to re-analyze and correlate the available information.

The re-analysis shows that transition Reynolds number of a flat plate with zero pressure gradient is a function of the ratio of the height of the roughness element to the displacement thickness of the boundary layer at the element, this functional relation being a better representation of the data than a constant critical Reynolds Number of the roughness element. Other data show that the effects of roughness are similar in streams of different initial turbulence and that a plot gives good correlation of all the data for a given shape of roughness element when transition occurs downstream from the roughness element. At a certain value of the height-thickness ratio dependent on the streamspeed, location of roughness element, and airstream turbulence, the transition position reaches the element and remains there as the height or the stream speed is further increased.

The paper also discusses available data on the effect of distributed roughness on

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(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

"In this business, catalogs are no damn good."

I was poring over Whittaker's printed material one day and noticed a complete absence of catalogs on the innumerable products in their line. "How come?" sez I, and up above is the answer I got.

Here's the reasoning of the Whittaker crew . . . and what they did about it. There are two standard types of communications from supplier to consumer – the bulky, incomplete catalog system and the glib sales pitch.

Unfortunately when you root a catalog out of the library or a lower desk drawer it's inevitably out of date.

And most sales pitches end up in the circular file.

Once Whittaker issued catalogs and tried earnestly to make them fill the need. They were loose leaf arrangements in which various basic items – plug valves, drain cocks, relief valves, etc. – were listed, and were augmented from time to time with various coded sketches, dimensions and meager performance data.

But the original catalogs didn't work out. They were far too expensive to be sent out in great numbers. Those that were delivered invariably turned up lost, strayed or stolen. And as Whittaker surged from standard units into a wide range of specialist production, it was impossible to keep the catalog up to the minute.

Another tack was tried. This time it was a catalog with a hard binding, slick paper, pleasing two-color appearance; modified isometric drawings, more technical information. But the same old problems cropped up again. The listings weren't reaching a fraction of the people who should have seen them, and information stumbled well behind development.

Besides, Whittaker felt itself becoming tabbed as a "catalog house," a reputation far from desired by the expanding Southern California valve concern.

What to do?

Sales pitches were disdained as amateurish and useless. Valves are sold with fact, not with flights of fancy. Glowing predictions of developments yet unachieved were merely a nuisance and an irritant to the reader. "No high pressure – nothing hypothetical" became the unspoken Whittaker motto.

Late in 1950, the Whittaker Field Engineering Department hit upon the idea of issuing design bulletins. These were standard-size information brochures of four, six or eight pages, suitable for easy filing, and with varying four-color format and actual photographs of the valves presented.

From the first bulletin, the system proved to be elastic. As soon as each individual development proved out, a bulletin was prepared on it and sent to everyone in the industry who might have use for it.

More factual, usable data could be incorporated in these bulletins. Cut-away functional drawings and diagrams could be included. Each brochure could contain as much straight technical matter as was necessary to tell the story of the valve and its operations.

The various features of the unit – summaries of description, application, capacities, configurations, line sizes, mountings, installation and removal, pressure and leakage, seals, test data, flow and pressure drops, metering, radio noise, actuator, over-rides and incidental factors and specific technical charts or graphs – were shown without fanfare, hoopla or sales pitch.

The design bulletin – one more example of Whittaker ingenuity and service – has revolutionized communication from supplier to client with its clarity, speed and blanket coverage.

Extra copies, together with details and blueprints on every valve and variation, are always available through your nearest Whittaker field office – a far cry from catalogs and sales pitches.

transition on a flat plate, and some of the published data on roughness effects on transition on airfoils.

▶ **Studies of Some Effects of Airplane Configuration on the Response to Longitudinal Control in Landing Approaches.** Ralph W. Stone, Jr., and William Bihrle, Jr., Langley Aeronautical Lab., NACA.

This paper presents the results of a study of the response to longitudinal control deflections of airplanes during slow-speed landing approaches as in carrier landings. The results for current configurations that have no horizontal tails are compared with the results for a conventional configuration. Some effects of the differences in airplane configuration on the response characteristics, particularly the change in height immediately following control movement, are discussed.

▶ **On the Free-Flight Motion of Missiles Having Slight Configurational Asymmetries.** John D. Nicolaides, Aerodynamicist, Ballistic Research Labs., Aberdeen Proving Ground.

Theories for the free-flight motion of missiles are combined to yield a theory for the basically symmetric missile which contains the usual aerodynamic force and moment system, effects of slight configurational asymmetry and also the effects of rolling velocity (i.e., the gyroscopic terms and the static and dynamic Magnus terms).

The theory yields the condition for dynamic stability of statically stable and statically unstable missiles and predicts that the presence of configurational asymmetries, together with rolling velocity, may result in "resonance instability."

Models of a simple finned missile having control-surface deflection are gun-launched at supersonic velocity in the Aberdeen spark photography range, and the free-flight pitching and yawing motion and the transverse displacement are obtained. The tricyclic theory is fitted to the experimental data by the method of differential corrections. The results indicate that the theory accurately represents the actual motion.

▶ **Some Aerodynamic Effects of Streamwise Gaps in Low Aspect Ratio Lifting Surfaces at Supersonic Speeds.** Z. O. Bleviss, Aerodynamics Engr., and R. A. Strubble, Aerodynamicist, Douglas Aircraft Co., Inc.

The purpose of this paper is to obtain some understanding of the effects of streamwise gaps in low aspect ratio lifting surfaces by investigating a simple configuration whose characteristics are expected to be typical (such problems arise, for example, for all-movable tails and variable-incidence wings).

The configuration consists of a lifting half-delta wing adjacent to a vertical wall in such a way that the wing side edge is parallel to the wall and forms a streamwise gap. The usual assumptions of linearized supersonic wing theory are made, and the following wing characteristics are studied as functions of gap size, Mach Number, and leading-edge sweep: spanwise lift distribution, lift, center of pressure, drag due to lift, and vorticity at the trailing edge.

In addition, in connection with wing-tail interference, the strengths and initial positions of the rolled-up trailing vortices are

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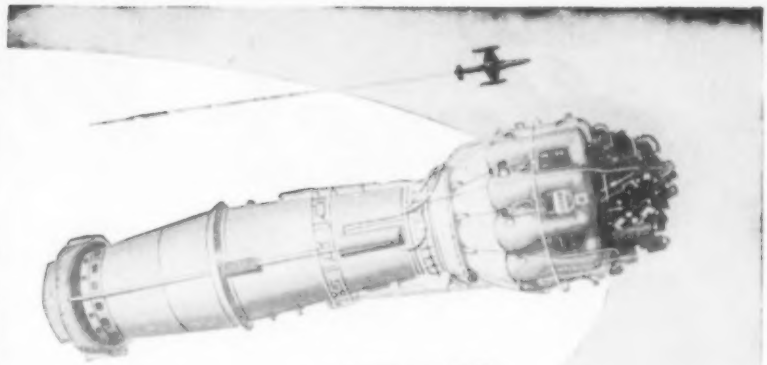

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HARDENED GROUND ROLL-THREADED PARTS

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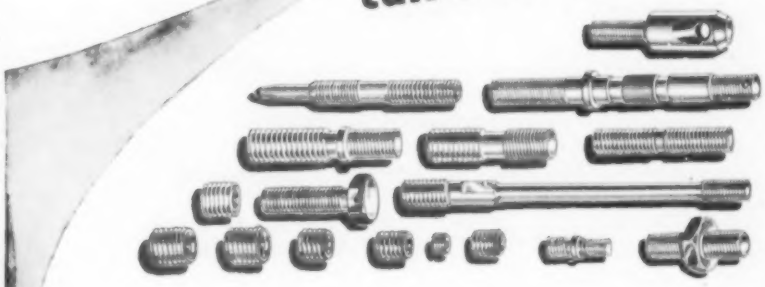

WHETHER FOR EXPERIMENTAL OR QUANTITY PRODUCTION, Ohio Electric can give you faster service on studs, bushings, inserts, or other parts made to the highest precision tolerances. A large volume supplier to major producers of jet engines and accessories, Ohio Electric is tooled and equipped to give you a better break on price and delivery on threaded parts made to "teaths." So reduce your lead time by turning your problems in hardened ground roll-threaded parts over to Ohio Electric. A call or letter will bring our representative on the double.

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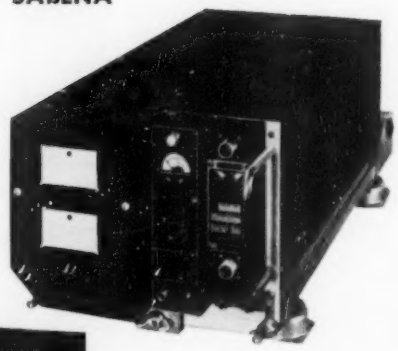
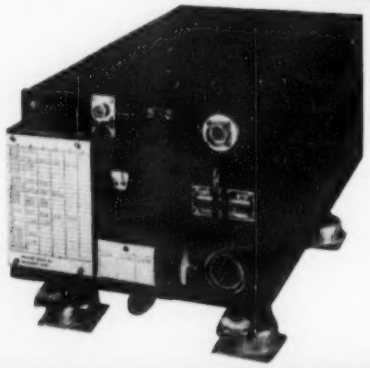


Transmitter Model AT-144. Manufactured according to ARINC characteristic No. 522. Frequency ranges 1.6-1.75 and 2.0-22.0 mcs. covering 144 independent crystal controlled frequencies. 10 tubes. Operates on 28-volt DC. Carrier power output 100 watts A1-A3. Without removing transmitter from rack, frequency plan can be altered by changing the crystals only. Weight 44 lbs.



Receiver Model AR-144. Frequency range 2.1-18.5 mcs. covering 144 crystal-controlled frequencies in 24 bands. 7 tubes. Weight 33.2 lbs.

International Air Carriers Specify

AEROCOM

144 Frequency H. F. Communications Equipment

Flexibility, dependability, and power are important reasons why Aerocom's AT-144 and AR-144 are selected by the world's foremost international air carriers.

Flexibility—with separate transmitter and receiver, cross band operation is possible. Reception is possible without placing transmitter in operation thus avoiding radiation on unauthorized frequencies such as channels for weather broadcasts and time signals.

Dependability—the major component parts of this equipment have been proven in years of actual service. Simplicity of design has minimized the number of tubes required, all of which are operated conservatively.

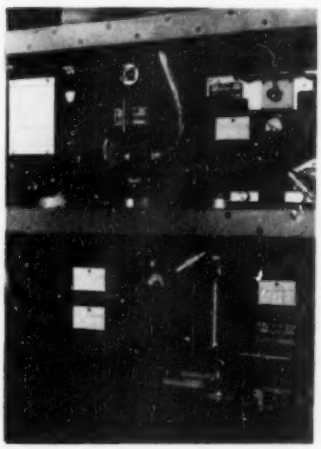
Power—here is a new 100-watt high frequency airborne transmitter with unusually high average modulation level (by employing an adjustable peak clipper –filter). This transmitter with related power supply and automatic tuner is designed to meet ARINC characteristics Nos. 522, 523, and 525. It is the practical answer to the need for modern high frequency communications equipment.

All units operate solely on a 28-volt DC supply (400-cycle power is not required). Under emergency conditions, this means minimum drain on power source.

Installation and removal for servicing can be done easily by one man, as each of the four component units is no larger than one ATR size; the weight of heaviest unit is less than 45 lbs.

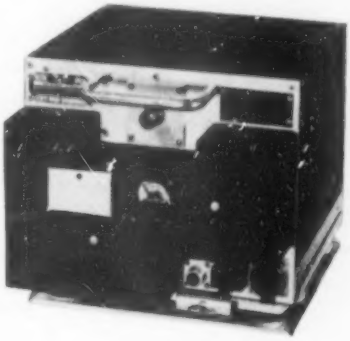
The Model AR-144 receiver (C.A.A.T.C. 2R3-2) has been in actual use for more than a year, while the 72 frequency model of this receiver has been in service better than two years—a total of more than 400 units in actual use!

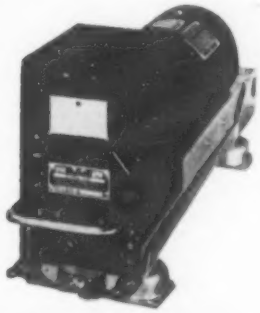
Aerocom's high-frequency equipment has already been engineered for installation. It has been service-tested in international air carrier operation. Learn now how efficiently it can meet your communication requirements!



These Aerocom engineering models were flown under service conditions during May and June, 1952, in a Pan American Trans-Atlantic Strato Clipper.

Automatic Antenna Tuner Model AAT. Follows ARINC characteristic No. 525. Designed to give minimum tuning time and maximum efficiency with grounded-type antennae employed on 4-engine aircraft. Frequency ranges 1.6-1.75 and 2.0-22.0 mcs. 8 tubes. Operates on 28-volt DC. Weight 19 lbs.





Power Unit Model D.P.U. Manufactured according to ARINC characteristic No. 523. Uses a well-proven, commonly-used dynamotor type. Operates on 28-volt DC. Weight 33 lbs.

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LEWIS

Thermocouple Lead-Wire

IRON CONSTANTAN — Figure A, lead-wire to specification AN-W-8. Available in type II or III class A or B. Thermocouple wire supplied in AWG sizes from 18 to 30 to Bu Stds RP1080.

COPPER-CONSTANTAN—Figure B, lead-wire used with chromel-alumel indicators, effects considerable saving in weight over chromel-alumel leads of same resistance. Available in AWG sizes or with special stranding to seven ohms per 200 feet.

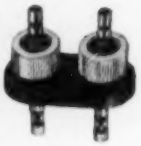
CHROMEL-ALUMEL—Figure C, lead-wire to specification AN-W-29. Available in types I, II or III class A or B. Available with stainless steel overbraid. Thermocouple wire available in AWG sizes 16 to 24.

Write for data on any of above or wire to new MIL specifications.

ACCESSORIES FOR TEMPERATURE INDICATORS

AN5534-1

Developed by Lewis, the AN5534-1 resistor block is used to adjust the overall external resistance of the indicator to eight ohms.



AN5537-1

Another Lewis development, the AN5537-1 Firewall Connector Block provides a quick disconnect for thermocouple engine leads. Available with angle plugs as part AN5537-2.

TERMINALS FOR THERMOCOUPLE LEADS

In accordance with AN5539 in brass as well as chromel and alumel. In addition, we manufacture chromel and alumel terminals with longer insulation grips in accordance with the new AN5548 standards.

THE LEWIS ENGINEERING CO.

Manufacturers of Complete Temperature Measuring Systems for Aircraft

NAUGATUCK, CONNECTICUT

investigated. An illustrative example of the gap effect on wing-tail interference is also presented. The viscous effects, which are important for very small gaps, are discussed qualitatively.

► **Transonic Flow Past Simple Bodies.** J. D. Cole, G. E. Solomon, and W. W. Willmarth, California Institute of Technology.

Transonic flow past conical tips, a lifting wedge, and a lifting flat plate is investigated theoretically and experimentally. The existence of a closed smooth subsonic zone embedded in a supersonic flow field is demonstrated experimentally for transonic flow past conical tips. The cases discussed represent simple, fundamental cases for which the flow pattern from subsonic through sonic to supersonic flow can be obtained with relative ease. An understanding of these cases is extremely useful for handling the general transonic flow problem.

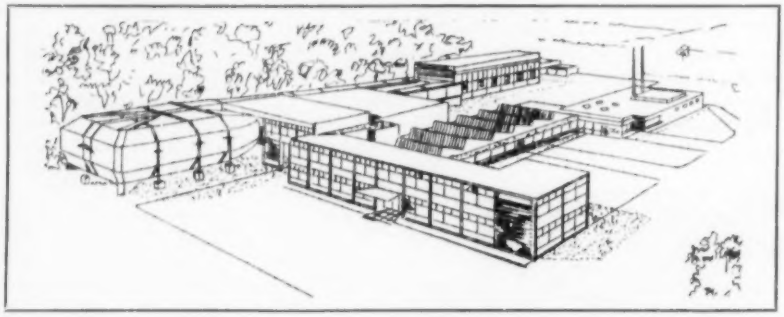
► **Supersonic Flow About Slender Bodies of Elliptic Cross Section.** A. Kahane, Principal Aerodynamicist, Development Div., Republic Aviation Corp., and A. Solarski, Senior Engr., Cook Research Labs.

A theory is presented for slender bodies of elliptic cross sections in supersonic flow, and is applied to the zero angle-of-attack pressure distribution on elliptic cones and parabolic-arc bodies of elliptic cross section. Results of several sample computations are presented.

Comparison is made with the nonlinear elliptic cone calculations and experimental results of Ferri; good agreement is obtained. The wave drag of bodies with elliptic bases is also treated. Application of the theory to bodies at angle of attack is indicated.

► **Experimental Investigation of the Characteristics of the Supersonic Laminar and Turbulent Boundary Layer at $M = 3.1$.** W. S. Bradfield, Lecturer, D. G. DeCoursin, Asst. Scientist, Rosemont Research Center, and C. B. Blumer, University of Minnesota.

Measurements by the momentum-loss method in the boundary layer of a cone immersed in a supersonic flow at Mach 3.1 are presented. Corresponding measurements in the laminar boundary layer on a flat plate are presented for comparison. Total pressure profiles, velocity profiles, and skin-friction coefficients are obtained over a Reynolds Number range from 0.2×10^6 to 22×10^6.



ARA TRANSONIC WINDTUNNEL is expected to be in operation by mid-1955.

U. K. Industry Team Builds Tunnel

Construction of Britain's new high-speed tunnel—sponsored as a cooperative venture by 14 of that country's aircraft firms—is scheduled to begin early this year.

Since starting work on the project about one year ago, detailed plans have been drawn and are now being completed. Expected cost is around $4 million, and the completion date is estimated as sometime in mid-1955.

► **Practical Tests**—The major purpose of the tunnel is to test aircraft models from first proposal stage to final design. Little basic research work is to be conducted.

Original planning included two tunnels; but recent techniques have advanced the art to the point where the range of Mach numbers up to 1.4 will be covered in one tunnel. A smaller tunnel will be added later for speeds up to Mach 3.0.

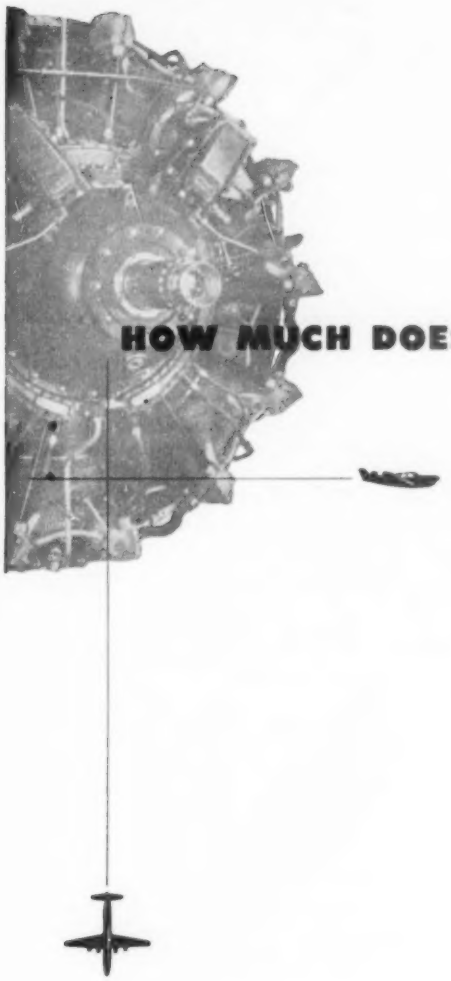
Location will probably be near the National Aeronautical Establishment's new site at Bedford, where one Government tunnel is already in operation and a second will soon be completed.

Working section of the industry tunnel will be 10 x 8 ft., so that models of about 6-ft. span can be handled. Power requirement is a total of 35,000 hp. furnished by electric motors.

Heat from the tunnel—generated by air friction at high speeds—will not be wasted in cold weather. The tunnel is water-cooled, and the warm water will be routed through the buildings for office and shop heating.

New houses will be built near the site for the technicians and staff of the Aircraft Research Assn., the operating company that was formed by the aircraft firms cooperating in the venture.

Members of ARA are: Blackburn & General Aircraft, Boulton Paul Aircraft, Bristol Aeroplane Co., Fairey Aviation Co., Folland Aircraft, Handley Page, Hawker Siddeley Group, Rolls-Royce, Saunders-Roe, Vickers-Armstrongs and Westland Aircraft.



HOW MUCH DOES AN OVERHAUL *finally* COST?

It costs more than just the price charged by the overhaul shops. Delays in engine delivery pile up expensive ground time. Small, not quite right fits and adjustments add mechanics' time and pilot annoyance throughout the service life.

The total of all these things make up your true overhaul cost. An Airwork overhaul eliminates these secondary costs. That is why an Airwork overhaul, whether of engine or engine accessories, saves you money!

Airwork provides factory new performance—every component is rebuilt, tested and inspected to the highest standard of dependability. Production line techniques equal to those of the original manufacturer are used—because that is the only way to get unvarying quality.

A production control board charts actual daily progress of your engine through Airwork. Potential troubles are spotted and eliminated before they can become bottlenecks. That is why you get on-time deliveries of your engines.

The proof of it all lies in the acceptance of Airwork as the prime overhaul base for 6 scheduled airlines—the people who know total overhaul costs best of all.

Airwork has 21 Class A Dealers who will be glad to handle your overhaul and supply problems. Ask them about Airwork's Personalized Service, and the Airwork exchange program.

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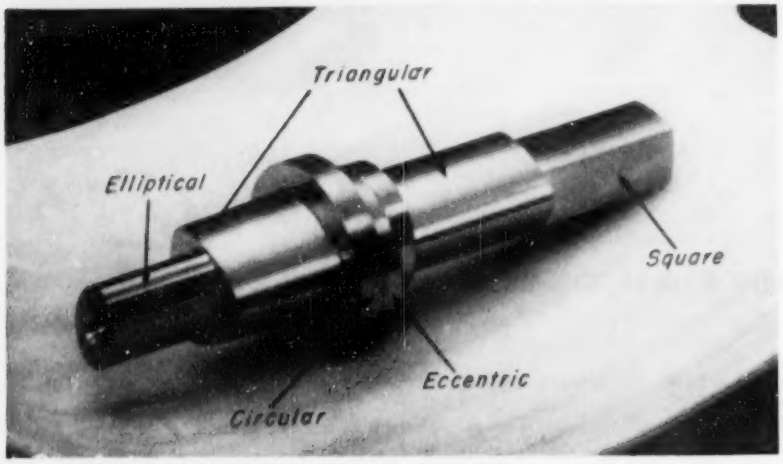
PRODUCTION



FIVE DIFFERENT PROFILES can be generated with this new Polygon Grinder.

New Tool Grinds Various Shapes

Polygon Grinder turns out triangular configuration said to be superior to splines, keyways for driving.

A grinding machine which generates a three-sided profile claimed to be superior to a spline or keyway as a driving medium is getting the attention of production engineers in the aeronautical and other industrial fields.

In addition to the triangular configuration, this grinder will generate elliptical, square, eccentric and cylindrical forms.

A key feature reported for the tool—known as the Polygon Grinder—is that it will grind the inside as well as the outside diameter of the three-sided and elliptical configurations. However, the inside diameter of all the non-circular profiles can also be produced by a broach prepared on the machine.

► **BuAer Interested**—Navy Bureau of Aeronautics is said to be interested in the potential production simplifications of the tool. It is reported to be delegating industry teams to witness demonstrations of the tool's accuracy and production speeds, at the S&S Machinery Co., 140-53 St., Brooklyn, N. Y.

One aircraft engine manufacturer already has the machine and is giving it close study aimed at bringing it into the production scheme. Another company that has the machine is conducting a study on Polygon-produced drives for application in the heavy industrial machine field. An American university is reported to be using the tool to develop operational and production data.

Ancestor of the Polygon machine is the K-Profil Grinder, developed in Austria in 1939 by Ernst Krause & Co., for connection of a shaft to a hole by means of a triangular profile. About 200 of these machines are said to have been in use between 1940 and 1945. The Germans are reported to have cut field maintenance considerably with mechanisms using the three-sided drives.

On the basis of experience with the early grinder, the present Polygon machine was developed by a European tool manufacturer in collaboration with Krause. S&S has the manufacturing and sales rights in this country and Canada.

The axis of the Polygon's grinding wheel moves in an oscillating path which is synchronized with the uniform rotary motion of the workpiece.

- **Eccentric** is produced when the wheel makes one cycle to a single rotation of the work.
- **Ellipse** is formed by ratio of two cycles of the wheel to one rotation of the work.
- **Triangle shape** is generated by a three-to-one ratio.
- **Square shape** is produced by four-to-one ratio.

The movement of the wheel can be adjusted for cylindrical grinding, so that special profiles and cylindrical portions may be produced on the same workpiece with the same centers and set-up. The machine is said to grind inside and outside diameter tapers in the various configurations.

S&S contends that the Polygon machine will produce drive members faster, with more precision, and at less cost than a spline arrangement. Accuracy of the Polygon-produced male and female members are within .0002 in., and saving of manufacturing time over a spline with equivalent torque capacity is about one-third, it is claimed.

Another advantage reported for the three-sided drive is that it has a load-bearing surface of about 90%, against up to approximately 30% for the spline.

Inspection procedures on the Polygon-produced drives also are reported to be much simpler than for spline make-up.

PRODUCTION BRIEFING

► **Witbeck Aircraft Corp.**, Gainesville, Tex., has been awarded a major subcontract by Temco Aircraft Corp., Dallas, for complete empennages, outer wings, seats and quadrants for T-35 Buckaroo trainers.

► **Grand Central Aircraft Co.**, Glendale, Calif., recently delivered a prototype helicopter simulator for Navy classroom instruction of maintenance and operation personnel.

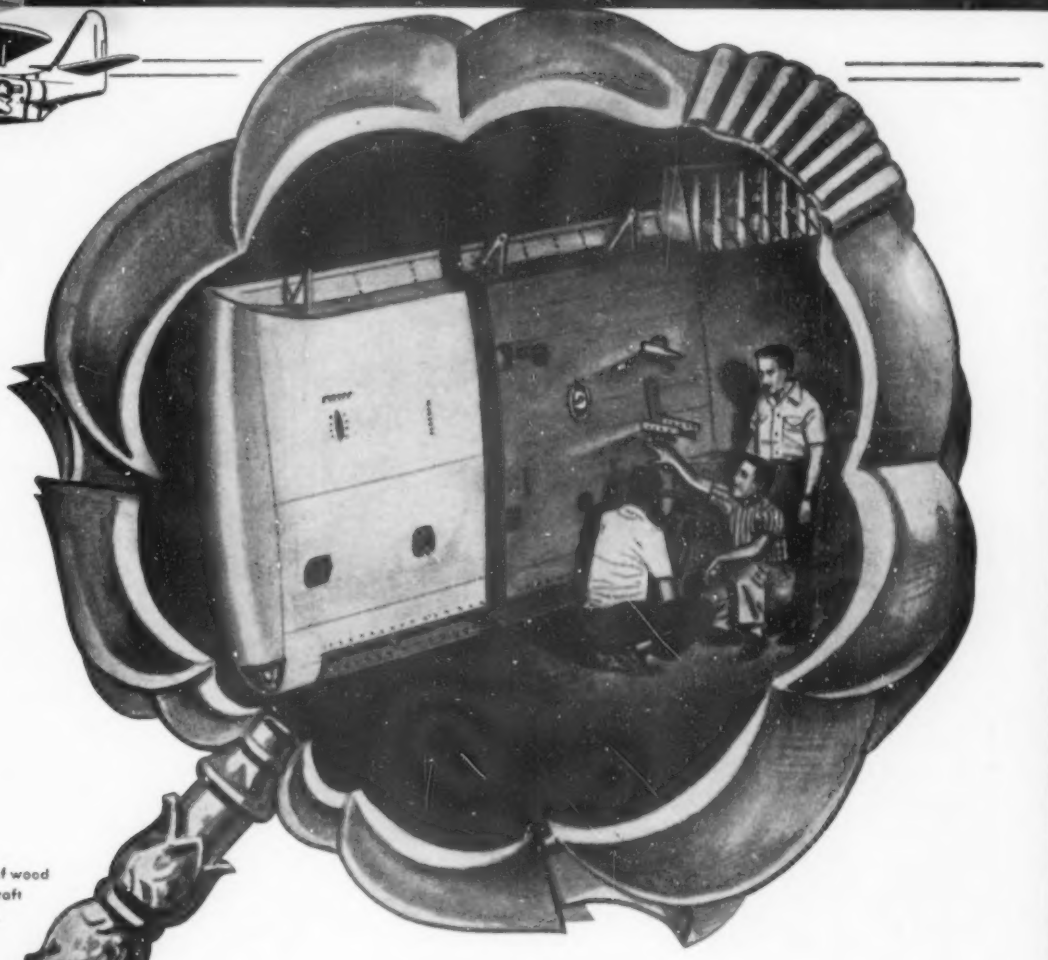
► **Reaction Motors, Inc.**, Rockaway, N. J., is undertaking a $3.5-$4 million construction program to provide new engineering, research, laboratory and administrative facilities. A 60,000-sq. ft. machine shop is planned.

► **Mechaneers, Inc.**, Bridgeport, Conn., has acquired Plant 3 at Bridgeport Municipal Airport for expanding output of aircraft assembly jigs, tools and dies and metal and fabric-covered assemblies.

► **Chance Vought Aircraft Division** of United Aircraft Corp. is constructing a new $1.6-million structures test building in Dallas. The new three-story building—scheduled for completion Aug. 1—will house machine shops, X-ray rooms, chemical, materials structure and hydraulic laboratories and a universal test floor.

► **Electronic Engineering Co.** of California, Los Angeles, has received a $137,450 contract from the Navy for installation design work on guided missile instrumentation equipment at Naval Air Missile Test Center, Point Mugu, Calif.

► **Pacific Airmotive Corp.**, Burbank, Calif., has been named distributor for all products manufactured by Titeflex, Inc., including seamed and seamless metal hose, precision bellows, ignition harnesses, ignition shields, electrical connectors, rigid and flexible wave guides, filters and fuses.



Steven Chojnacki, general foreman of wood tools and dies, has been in the aircraft industry almost since its inception. Starting with the famous Flying Jenny he has spent 37 years in the industry, over 6 of them with Twin Coach.

Here's how Twin Coach helps lock Davey Jones's locker

GRUMMAN UF ALBATROSS amphibians have established remarkable records in rescuing downed airmen from Korean waters, often behind enemy lines.

Twin Coach was selected to build, in quantity, the massive center panel and wings for this important air-sea rescue craft. In addition to fabrication and assembly, Twin also installs all wiring and tubing, ships complete sections ready for final assembly.

Twin Coach plants, among the best equipped in the nation, are also in volume production on assemblies for helicopters, attack, and search planes. Modern facilities, modern equipment, and *experienced* manpower make Twin Coach a dependable source for every type of major airframe assembly.

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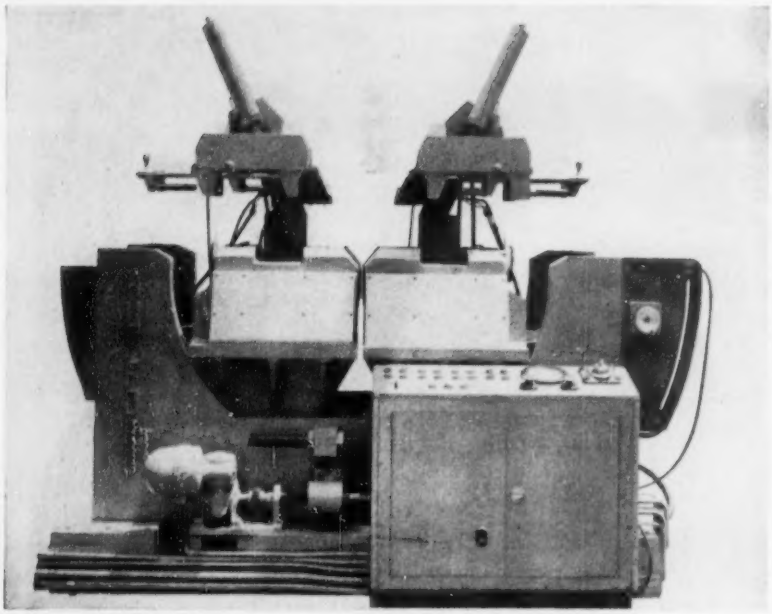
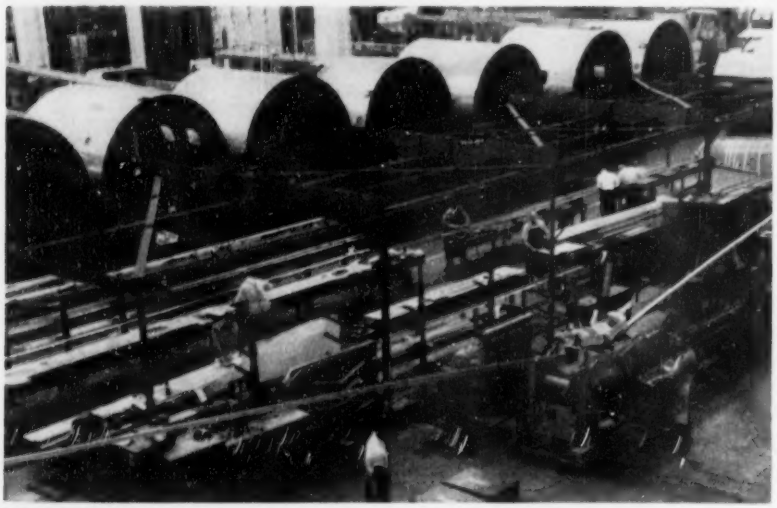


NEW MACHINE built for Lockheed Aircraft Corp. by Hufford Machine Works, Inc. . . .



BENDS BEAMS of high-strength aluminum alloy for Super Constellations.

Lockheed Bender Goes to Work

A special new machine has been put to work at Lockheed Aircraft Corp. bending high-strength aluminum alloy wing beam members. Hufford Machine Works, Inc., built the tool—one of a pair—to Lockheed design specifications. The second unit is at Beech Aircraft, Wichita, where it is used for processing Lockheed parts supplied by Beech.

The new tool will handle beam members measuring 5x3¼ in. and more than 60 ft. long, bending them to angles up to 50 deg. at 325F.

A rotational control can be adjusted so that springback will not warp the bent part from the proper plane.

▶ **Fast, Too**—Previously, Lockheed bent beam caps and other extrusions by use of Cerrobend or by bend blocks and dies. But the 75S-T required hot bending, so Lockheed's manufacturing research branch came up with the idea for the new tool.

Jobs formerly requiring 30 minutes are now done in three minutes. And Lockheed says that greater bend accuracy also is realized.

The tool has self-contained hydraulic power. For processing different shapes, only inexpensive inserts are needed. These adapt themselves to the part cross-section, and clamps close a set of jaws to grip the part together tightly.

Integral heater platens are automatically regulated for temperature. Because springback varies with small temperature differences there are provisions to gage the heat of the part while it is clamped in the machine.

▶ **Bend Control**—During the bending operation, an equalizer gives symmetrical elevation of the jaws. There are adjustable centers of motion for each jaw and automatic, adjustable stops for controlling bend. Jaws can be rotated around the part centerline to proportion dihedral and sweepback angles properly and allow for springback in both planes.

Bend angle can be checked quickly during the tool try by opening the clamps and inserting a template. The tool can exert a backward pull to correct a part which is overbent during initial adjustment. It will also remove twists warpage sometimes found in machined or extruded parts.

Bending speed is adjustable. All functions are pushbutton-controlled. No special operating skill is required, Lockheed says.

USAF Contracts

Following is a list of USAF contracts recently announced by Air Materiel Command.

Conner Air Lines, Inc., P. O. Box 122, Miami Springs, Fla., air transport service, $312,000.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, repair of wing spar, $40,137.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, amplifiers, 2,918 ea., 1,434 ea., indicators, 1,260 ea., $742,705.

Graflex, Inc., 154 Clarissa St., Rochester, camera, ground, 49 ea., synchronizer, 355 ea., camera, pressback, 60 ea., $38,491.

Hoover Electric Co., 2100 S. Stoner Ave., Los Angeles, actuator assembly, engineering data, maintenance data, 56 ea., $28,000.

Lackner Co., Inc., Lackner Building, Cincinnati 14, indicator, 6,722 ea., $296,560.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids, computers, 1,098 ea., converters, 1,071 ea., spare parts, $363,000.

Lewis Engineering Co., Naugatuck, Conn., bulb, 5,815 ea., $26,749; temperature bulb, 3,780 ea., spares, 3,290 ea., $56,065.

Lundy Mfg Corp., 36-08 33rd St., Long Island City, spare parts, $115,999.

Propeller Div., Curtiss-Wright Corp., Caldwell, N. J., propellers, control parts and subassemblies, $505,000.

Southern Air Transport Inc., P. O. Box 114, Miami International Airport, Miami 48, Fla., air transport service, $288,000.

Sunbeam Corp., 5600 Roosevelt Road, Chicago, tachometer indicator, 300 ea., $66,579.

V&H Electronic Industries, 2033 W. Venice Blvd., Los Angeles 6, mounting, 66 ea., radio receiver, 100 ea., transmitter, 129 ea., $99,685.

Weston Elect. Instr. Corp., 614 Frelinghuysen Ave., Newark 5, temperature bulb, 6,561 ea., $49,994; bulb, 8,593 ea., $74,759.

Willets Co., Norman, 316 W. Washington St., Chicago, camera, copying, 60 ea., $46,500.

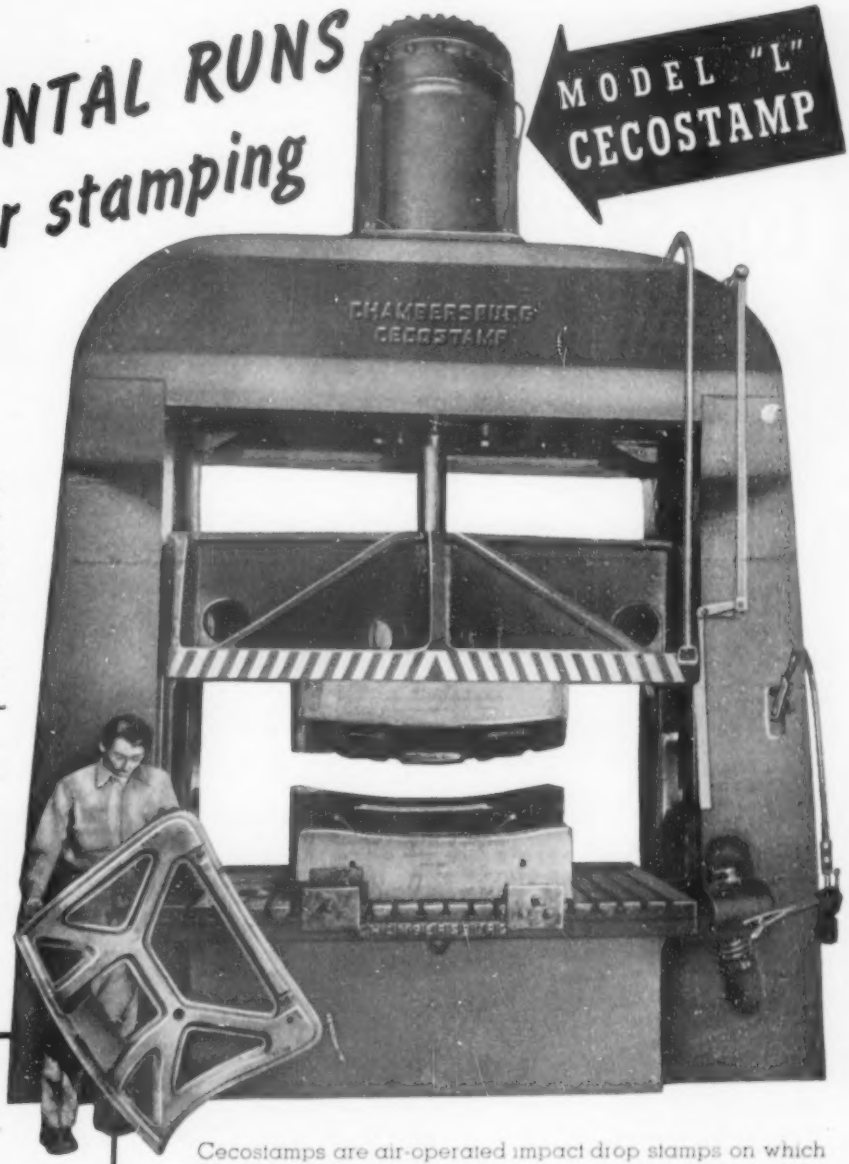
Aero Instrument Co., 5105 Denison Ave., Cleveland, pitot tubes, 6,599 ea., $69,289; pitot static tubes, 2,465 ea., $41,412.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., aircraft equipment, $45,511.

Collins Radio Co., Cedar Rapids, receiver-transmitters, $450,000.

EXPERIMENTAL RUNS one of your stamping problems?

When you are required to turn out a small quantity of completely assembled units with all the accuracy and finish of final production, a CECOSTAMP can do the stamping jobs for you—accurately and economically. CECOSTAMP's versatility and accuracy, plus economical zinc alloy dies, combine to give you both satisfactory work and savings.



HERE'S AN EXAMPLE OF CECOSTAMP OPERATION

Forming rear deck panels for "mock-ups" of a new model of one of the popular cars was accomplished with a minimum of time and expense, using zinc alloy dies, on a 96" x 48" CECOSTAMP. The impact blow of the Cecostamp forms the part precisely and free of spring-back, making it ideal for development and "mock-up" work.

Cecostamps are air-operated impact drop stamps on which a wide variety of metal shapes can be made. Intensity of the impact is completely and instantly controlled by the operator. Low maintenance, operating economy, ram accuracy and the use of zinc alloy dies are engineered features of Cecostamps. Write for a copy of Bulletin 30-L-O.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

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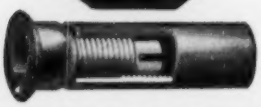
THE BLIND ANCHOR NUT OR/RIVET

ONE MAN INSTALLATION IN SECONDS



THE AVIATION STANDARD
for Screw Locking Anchor Nut Uses and Metal to Metal Fastening.

1 Drill one (1) hole.

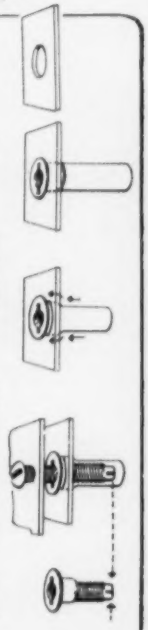
2 Insert Lok-Skru with either Hand or Power Lok-Skru Tool.

3 With Lok-Skru Tool draw barrel over shoulder of Lok-Skru and flush with metal. This provides a Blind Anchor Nut for Secondary Attachments.

4 TO FASTEN ATTACHMENTS insert standard Machine Screw through hole in attachment and into Lok-Skru.

As machine screw is tightened into Lok-Skru it is securely locked by means of the "Specially Crimped" locking-end of the Lok-Skru.

Crimped internal threads of Lok-Skru provide secure locking device for attachment screw.



Write for Folder
Handy information on the many uses and application of Lok-Skrus in airplane construction with complete data on types and sizes.

THE DILL MANUFACTURING CO.

FACTORY
700 East 82nd St.
Cleveland 3, Ohio

BRANCH
1011 S. Flower St.
Los Angeles 15, Calif.

Navy Contracts

The following contracts were announced recently by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11.

Goodyear Tire & Rubber, 1144 E. Market St., Akron 16, maintenance parts for JRB, SNB aircraft, $138,229.

Glidden Co., Chemicals-Pigments Metal Div., 1717 Summer St., Hammond, Ind., pigments, copper, dry, 118,800 lb., $382,655.

Douglas Aircraft Co., El Segundo Plant, Calif., rack assemblies, 96 ea., $64,716.

Bendix Prod. Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend, Ind., maintenance parts used on carburetors for various aircraft, $44,698.

Crosby Chemicals, Inc., De Ridder, La., turpentine, 36,000 gal., $26,415.

Cargill, Inc., Fald Div., 200 Grain Exchange, Minneapolis, linseed oil, 24,000 gal., $34,400.

Liquidometer Corp., 41-03 36th St., Long Island City, indicator and transmitter, 463 ea., $59,074.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids, Mich. 2, actuator and spare parts, 96 ea., $67,574.

Lion Uniform Co., 44 Webb St., Dayton 3, suit, flying, 7,925 ea., $95,021.

United Aircraft Corp., P. O. Box 5907, Dallas, maintenance parts for F4U aircraft, $122,880.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, pumps and motors, $423,630; winch, hydraulic, 36 ea., $26,701.

Douglas Aircraft Co., 3000 Ocean Park Blvd., Santa Monica, strut assembly, 30 ea., $124,575; 17 ea., $70,593.

Goodrich Co., B. F., 500 S. Main St., Akron 18, wheel, 322 ea., $42,756.

Sperry Gyroscope Co., div. of the Sperry Corp., Great Neck, N. Y., maintenance parts used on various instruments, $36,876.

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford 8, Conn., stand, 30 ea., $28,200; maintenance parts for P&W engines, $151,228; spare parts for P&W engines, $189,632, $2,427,948, $751,086, $3,097,592, $234,400, $62,000, $2,037,737, $892,519, $215,282, $216,373.

United Aircraft Corp., Hamilton Standard Div., East Hartford 8, Conn., tools for propeller overhaul, $150,523.

General Electric Co., Lamp Div., 3201 Walnut St., Philadelphia 5, lamps, $26,978.

Stoner-Mudge, Inc., 2000 Westhall St., Pittsburgh 33, compound, 500 gal., $34,530.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., maintenance parts for various aircraft engines, $51,528; indicators, $51,005.

AiResearch Mfg. Co., 9851-9951 Sepulveda, Los Angeles 45, actuator, 24 ea., $56,647.

Lewis Eng. Co., 339 Church St., Naugutuck, Conn., indicator, 1,089 ea., $185,031.

Air Associates, Inc., Teterboro, N. J., actuators and fitting assemblies for various aircraft, $135,660.

Titeflex, Inc., 500 Frelinghuysen Ave., Newark, N. J., conduit, flexible, 14,000 ft., $38,786.

United Aircraft Corp., Chance Vought Aircraft Div., P. O. Box 5907, Dallas, spare parts for F4U aircraft, $46,329.

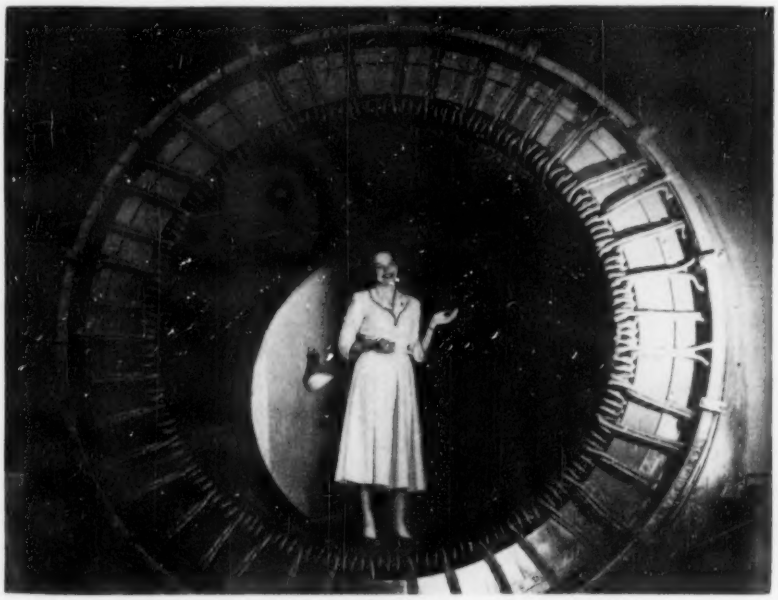
Sperry Gyroscope Co., div. of the Sperry Corp., Great Neck, N. Y., indicators, gyro horizon, $148,693.

Goodyear Tire & Rubber, 1144 E. Market St., Akron 16, maintenance parts used on brake assemblies, $741,073.

Skyway Precision Tool Co., 1107 S. Fremont Ave., Alhambra, Calif., photoflash ejectors, 195 ea., $107,518.

Western Electric Co., Inc., 195 Broadway, New York, marine cable, $500,000.

Morse Instrument Co., 21 Clinton St., Hudson, Ohio, printer, contact, 30 ea., spare parts, engineering data, 1 set, $729,327.



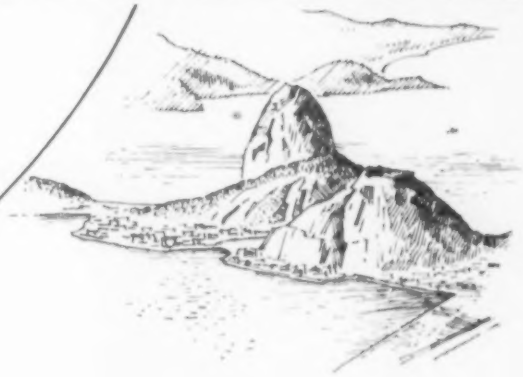
HUGE MOTOR FOR BOEING WINDTUNNEL

Huge component for 36,000-hp. wound-rotor motor is installed in Boeing Airplane Co.'s supersonic windtunnel for testing new plane models. It represents one extreme in the size of electrical equipment used in the aviation industry—another is the tiny airplane motor held in the girl's palm. Built by Westinghouse, the new tunnel motor will complement the Seattle test facility's original 18,000-hp. unit, to give Boeing what is believed to be the most powerful privately owned windtunnel in the world. Motor weighs 225,000 lb., will operate at 480 rpm., with clearance of only .09 in. between rotor and stator. Installation is part of $1.5-million improvement program in which tunnel's single 16-blade fan will be replaced by two-stage, 72-blade fan. Building will be extended, tunnel will be modified and strengthened.

Backed by more than two years in regular airline service

OPERATED BY SAS UNDER THE MIDNIGHT SUN, BY VASP OVER HOT BRAZIL

- The high-economy replacement for the world's many pre-war type airliners
- Big payload (up to 40 passengers plus cargo
- Unexcelled low speed characteristics (wing loading 38 lb/sq. ft. /185 kg/ m^2/, stalling speed 80 mph /130 km/h)
- Unsurpassed climb performance at high-altitude airports
- Utmost design simplicity for easy maintenance
- "Four-engine size" cargo capacity (11,o m^3)
- Tricycle landing gear with large-diameter wheels for rough-field operations



SAAB-FOKKER AGREEMENT FOR INCREASED PRODUCTION

Scandia

SVENSKA AEROPLAN AKTIEBOLAGET • LINKÖPING • SWEDEN

Changing the map of the world

—*with RCA Shoran*

A SHIP SANK in these remote straits—because a chart was wrong. But that won't fool navigators any more. Modern aerial survey . . . using RCA Shoran and photography together . . . recorded the *true* shoreline (the lines in white). Now, the charts are right!

Surpassing any optical survey system now in use, this radar "yardstick" can map land-and-water areas never explored by man—and do it at flying speeds as high as 600 mph. Accuracy is better than 50 feet in 100 miles or more. Here's how it's done.

Two widely separated SHORAN stations on the ground (or aboard ship) form the base of a triangle. The plane becomes the apex. Pulsed radar signals from the SHORAN are received by each ground station and retransmitted back to the pilot. On a radar screen the pilot sees one "pip" for each station signal. He calibrates the "pips" and gets his fix. Cameras used with the Shoran equipment simultaneously photograph the calibrations—and the ground along his course. *Result: a highly accurate and permanent record of every square foot he covers.*

Just another application of RCA Shoran—added to its use in locating oil wells, plotting microwave radio relay and pipeline routes, detecting mine fields, and precision bombing.

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT CAMDEN, N.J.

Lear Damper Steadies F-86D

Sabre gets new 5-lb. unit that shares servo actuator with F-5 autopilot; rate gyro omits gimbal bearings.

By Philip Klass

Lear, Inc. has announced a new lightweight yaw damper of novel design that prevents "dutch roll" or "snaking" of North American Aviation's F-86D interceptor during highspeed, high-altitude flight.

The 5.2-lb. damper does a job that might have required an additional hundred pounds of airframe weight if NAA engineers had chosen to provide the needed damping by aerodynamic means.

Designated the Model 1500D damping control, the Lear device can be used for yaw- or pitch-axis damping. On the F-86D, the damper operates as a sort of junior partner to the Lear F-5 autopilot used on the same plane.

When the F-5 is in use, the autopilot itself provides the necessary damping, and the separate Lear control is in standby condition. When the autopilot is shut off, the damper automatically takes over without any delay for warm-up.

The two systems are not completely independent. They share a common F-5 autopilot rudder servo actuator, saving the space and weight of a separate damper servo.

▶**Behind the Pilot's Back**—The autopilot/damper servo is connected into the rudder control system in a differential fashion so that the servo-created rudder motion causes no deflection of the pilot's rudder pedals. The result is that the human pilot does not know that the damper is operating unless he looks back at the rudder.

The earliest type of yaw damper was unable to discriminate between a pilot-initiated turn, which it should allow, and an unwanted airplane yawing that the device should oppose. Lear says its damper permits the human pilot to turn at will without opposition from the damper.

▶**Lear Approach**—Like the General Electric and Minneapolis-Honeywell dampers, the Lear system uses a rate gyro to detect airplane yawing. However, instead of using the yawing velocity signal as generated by the rate gyro, Lear converts the signal into what essentially is an angular acceleration signal. This derived angular acceleration signal is applied to the servo actuator, which in turn moves the rudder to oppose the airplane's yawing motion.

Unlike most dampers and autopilots, the Lear system does not use a follow-up signal proportional to rudder position. Instead, it relies upon what is called "force feedback," reflecting increased slipstream forces on the rudder back into servo motor as rudder deflection is increased.

▶**Resembles the F-5**—The new damper boasts the same light weight, small size and simplicity of design that characterize the F-5 autopilot. The resemblance of the damper circuits to those used in the F-5 is no accident. North American approached Lear for the damper about the time Lear was starting production of its F-5. By applying autopilot circuits to the damper, Lear was able to cut engineering design time and to reap economies in manufacture.

In addition, Lear policy calls for exploiting the F-5 design by "lifting out" components and applying them to other tasks. For example, the F-5 vertical gyro forms the heart of the Lear remote-indicating horizon used in many current USAF planes (AVIATION WEEK July 14, 1952, p. 52). The F-5 servo is used in the damper and also is sold for other actuator applications. This policy enables Lear to build a maximum manufacturing load from its engineering efforts.

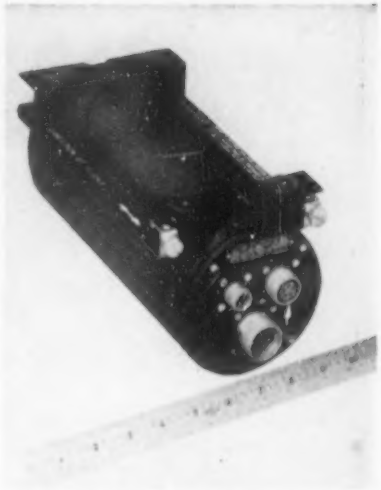
▶**Novel Rate Gyro**—A desired characteristic of rate gyros used in airplane stabilization is that their output signal be linear at reasonably high airplane oscillation frequencies. This requirement usually is met by designing a rate gyro with a natural frequency of 10-14 cps. whose linearity is improved by means of magnetic or viscous damping.

Lear has chosen a mechanically simpler solution in which the gyro is designed to have a very high natural frequency, thereby eliminating the complexity of damping.

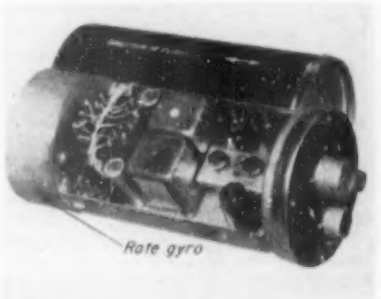
For competitive reasons, Lear is close-mouthed about gyro details except to say its rate gyro design eliminates the need for gimbal bearings required in conventional rate gyros.

The resulting gyro has a 33-cps. natural frequency which, without damping, gives a linear gyro signal (no appreciable phase lag) out to oscillation frequencies of 10 cps. The gyro itself is hermetically sealed in its own case before mounting in the hermetically sealed damper case.

▶**Damper Operation**—The 400-cycle a.c. gyro signal first enters a discrim-



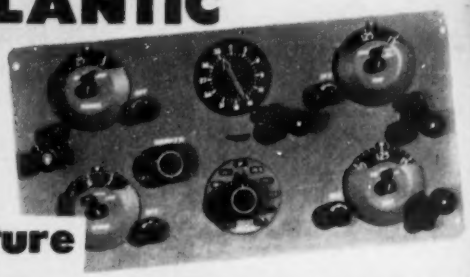
LIGHTWEIGHT Lear damper (5.2 lb.), shown in overhead vibration mount.



COMPACT construction of damper is evident when cover is removed.

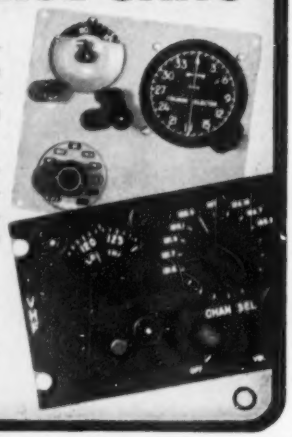
RATE GYRO owes much of its simplicity to elimination of gimbal bearings.

Let ATLANTIC design and manufacture your RADIO CONTROL UNITS



Because of ATLANTIC's many years of electronic experience, leading radio and aircraft manufacturers have come to us to design and manufacture in quantity, compact cockpit consoles, housing in a single, easily installed unit all the radio controls.

Meeting all applicable specifications, ATLANTIC custom-designed and volume-produced radio and other electrical control units can relieve you of valuable engineering time and many installation problems. No doubt we can help you, too.



Atlantic Aviation CORPORATION

TETERBORO AIRPORT, TETERBORO, N. J.

Almost everybody knows that Konigslow is the place to come with problems of stamping, forming, welding and assembly. Our shop is versatile, can often underbid your own production facilities on such jobs. The amount of engineering help we can offer will surprise you.
Otto Konigslow Mfg. Co., Inc.,
3600 Perkins Ave.,
Cleveland, Ohio

KONIGSLOW

For Dependable Hose Connections

WITTEK STAINLESS STEEL Aviation HOSE CLAMPS

TYPE WWD (Tangential—with one-piece housing)

TYPE FBSS (Radial—with floating bridge)

Conform to Navy & Air Force Specifications—C.A.A. Approved

WITTEK Manufacturing Co.

4305-15 West 24th Place, Chicago 23, Illinois

imator tube stage, where it is converted to d.c. The signal then passes through a derivative network, advancing the phase of the signal so that it leads airplane displacement by almost 180 degrees, Lear engineers say. The network also filters out unwanted high frequency harmonics from the gyro signal.

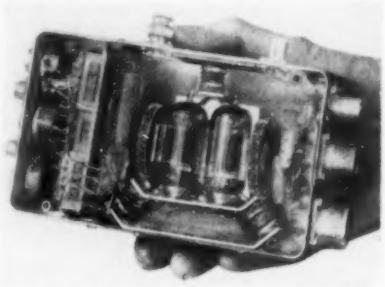
The signal is amplified in an intermediate stage and then applied to a dual-triode, which operates push-pull to control the current flowing through the servo's two magnetic clutches.

(The F-5 servo consists of a continuously running d.c. motor that drives two counter-rotating magnetic powder clutches. Exciting one clutch or the other causes the servo output pulley to rotate clockwise or counter-clockwise. The output torque is determined by the magnitude of the clutch current.)

The tube complement consists of three 12AY7s, (which are also used throughout the F-5), and two 6AL5 rectifiers. Tube filaments are paired off and connected in series across the airplane's 27-v. d.c. power supply to operate at about 85% of rated filament voltage. This is a standard Lear practice aimed at improving tube life. Reports to date on F-5 and damper tube life show the practice pays, Lear says.

▶**Gain Changer Provisions**—In some of the hotter jets, autopilot and damper sensitivity or "gain" needs to be varied at different airplane altitudes and speeds to maintain optimum performance. The damping control on the F-86D uses the gain changer provided for the autopilot.

In an airplane not equipped with the F-5, a separate servo actuator and a small gain changer would be needed, bringing total damper weight to about 15 lb. This is about half the weight of the sideslip stability augmenter used on the Northrop F-89, which performs a similar damping function (AVIATION WEEK Sept. 8, 1952, p. 40).



SHOCKPROOF AMPLIFIER

Internal vibration and shock mounts, made by Robinson Aviation, Teterboro, N. J., are a novel feature of this Pacitron fuel gauge amplifier recently developed by Simmonds Aerocessories, Inc. Internal vibration isolators cut over-all size and permit unit to be mounted in any position.

Here's How This

JOY AXIVANE® Aircraft Fan

Solved a Problem of Unmatched Complexity

WHEN the Air Force and Consolidated Vultee, manufacturer of the B-36, decided it was necessary to have a pressurization booster on this king-size bomber, they really threw the design-book away. The requirements for the blower would cause any prospective fan supplier to have misgivings. Specifications called for three separate fan-duties:

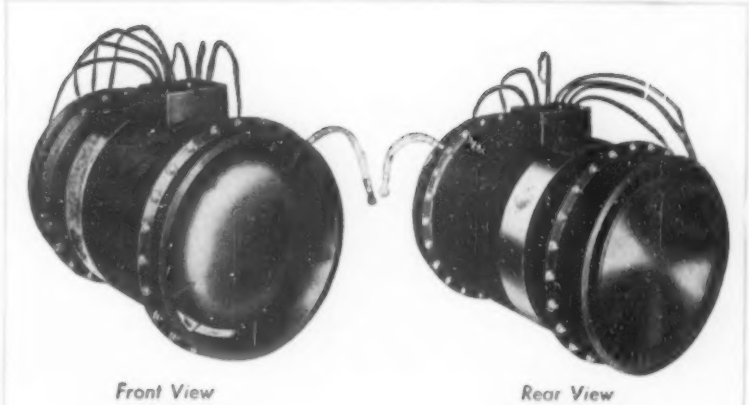
a *1180 CFM at 32" W.G., with an air density of 0.044 lbs./cu. ft.*

b *700 CFM at 40" W.G., with an air density of 0.10 lbs./cu. ft.*

c *680 CFM at 26" W.G., with an air density of 0.070 lbs./cu. ft.*

Space and weight limitations were stringent. The fan had to operate without excessive horsepower requirements due to a critical load on the generators. In addition, the fan motor had to be protected from hot air in the duct system.

Just about when the job seemed impossible, it was turned over to Joy engineers . . . and not only was the problem solved to the complete satisfaction of both the Air Force and the manufacturer, but the prototype fan was in their hands only six months after Joy received the order.



Front View **(INLET)** *Rear View* **(OUTLET)**

The fan exactly meets the three duties specified. It is 10" in diameter and 17" in length. Because of its combination of magnesium and aluminum construction, the fan weighs only 54 lbs. It is a two-stage unit, driven by a two-speed, 400-cycle motor. The efficiency of vaneaxial-fan design permits using a motor rated at only 12.6 H.P. continuous duty. The stationary vanes which support the motor are hollow, so that cooling air can be continuously directed over the motor. Each stage of the fan has a set of straightener vanes. Casing and hollow vanes are a single casting for shock-resistant strength.

● We freely admit that this is one of the toughest fan design-problems Joy engineers have ever tackled. On the other hand we are just as sure that, in the future, even harder problems will be taken on and solved. Even if your aircraft fan problem is not a difficult one, it is a good bet that the incomparable vaneaxial-fan design know-how which produced *this* AXIVANE fan will give you the most for *your* money. If you need an aircraft fan for any purpose, call on JOY—the world's largest manufacturer of vaneaxial fans.

Over 100 years of Engineering Leadership

Consult a Joy Engineer

WAD A3862

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

FILTER CENTER

▶ **USAF Eyes Higher Frequency Power**—Air Force is surveying avionics industry to determine interest in shifting from 400-cycle a.c. power to a higher-frequency source, possibly 2,000 or even 4,000 cycles. Survey results to date show considerably more industry interest in shift to high frequency than did previous survey of several years ago. One possible reason is growing use of magnetic amplifiers. As supply frequency goes up, magnetic amplifier response goes up, and size and weight go down.

▶ **Avionics Industry Expansion**—Recently announced expansions by avionics manufacturers include:

• **Guided Missiles, Inc.,** newly formed subsidiary of Resdel Engineering Corp., will handle production phases of Resdel's missile contracts, specializing in electronic guidance and tracking systems. GMI plant will be located near Resdel at 2351-59 Riverside Dr., Los Angeles, Calif.

• **Five-fold increase** in floor area resulted from PCA Electronics, Inc., move to new building at 2180 Colorado St., Santa Monica, Calif. The company manufactures miniature pulse transformers and delay lines used in computers, radar, and guided missiles.

▶ **Arinc Tubes Under Test**—Aeronautical Radio Inc. (Arinc), has launched a program to check quantitatively the life expectancy of its recently developed line of ruggedized vacuum tubes under actual airline operating conditions. Six airlines now in the program will keep detailed records of in-use time to failure for 200 specially identified tubes of each Arinc type. More airlines are expected to participate as program is expanded.

Facts and figures!..

FIGURE:
The moral to this has something to do with "Winterization"—what pilots bring their planes to SAC to get, and what blonde Ann Allen hasn't got in her training as an SMU co-ed deep in the heart of sunny Texas. She can't skate, but her trim, 19-year-old, 5'6½", 118 lb. figure is mighty nice on ice.

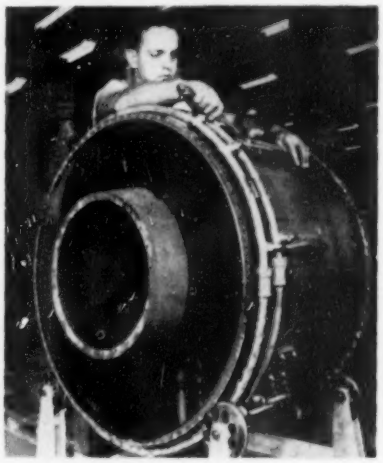
FACT:
Few services performed in this winged world of ours can compare with Southwest Airmotive engine overhauls in the complete faith and confidence accorded them by pilots.

If you haven't flown behind a SAC-overhauled engine, you have missed one of flying's most trouble-free experiences. Our 200-man engine shop is an authorized service station for both Pratt & Whitney Aircraft and Wright Aeronautical.

▶ **New Components**—

• **Sub-min rotary relay** operated by new-type rotary solenoid provides four- or six-pole, double-throw contact action in a hermetically sealed case only 1 in. dia. x 1 in. long. Contacts will handle 3-amp. resistive load or 1½-amp. inductive load at 26 v. Manufacturer says relay meets, and in some respects exceeds, MIL-R-5757. (Filtors, Inc., Electroquipt Controls Div., 30 Sagamore Hill Drive, Port Washington, N. Y.)

• **Miniature transducer** weighing less than 0.05 lb. measures linear displacement for strokes of 0.1 to 0.4 in. Manufacturer says device will withstand 50 G in direction of stroke and 30 G in any other direction. It is available with plain, threaded, or spring-return shafts. (Colvin Laboratories, 12 Court St., Morristown, N. J.)



TAILCONE THERMOCOUPLES

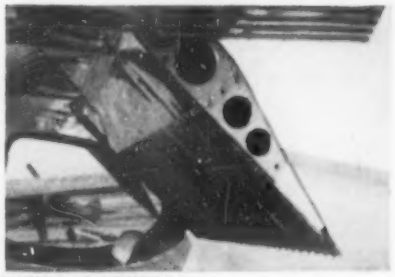
New rugged, fast-responding thermocouples, shown being installed in tailcone of a J47-GE-17 jet engine, are part of GE's automatic engine control which regulates fuel flow to prevent excessive tailcone temperature. GE's Meter and Instrument Dept., which builds the thermocouples, says they can withstand 1,900F temperatures and the buffeting of near-sonic-speed gases in the tailcone. Automatic engine control is built by GE's Aeronautic and Ordnance systems division.

AMERICA'S LARGEST SELLER...

Because It Offers More!

OUTSTANDING PERFORMANCE...

EXTRA COMFORT...



EXTRA SAFETY!

The "Golden Year" Cessna 170

Compare features, comfort, performance—*compare price*—and it's easy to see why the Cessna 170 is America's largest-selling private plane. No other make of plane on the market comes close to offering the same value.

And this year's Cessna 170—planned for Flying's Golden Anniversary Year is the best ever. The all-metal propeller is standard equipment. There's a sleek new cowling—beautiful new striping—luxurious interiors—new instrument panel with room for 3 radios, 10 extra instruments—a new six-outlet, heating-ventilating system. See your Cessna Dealer (listed in the yellow pages of your telephone book)—see the "Golden Year" Cessna 170.

ALSO SEE the completely new "Golden Year" Cessna 180 and the Cessna 190 Series. There's a Cessna that meets your needs.

Cessna 170

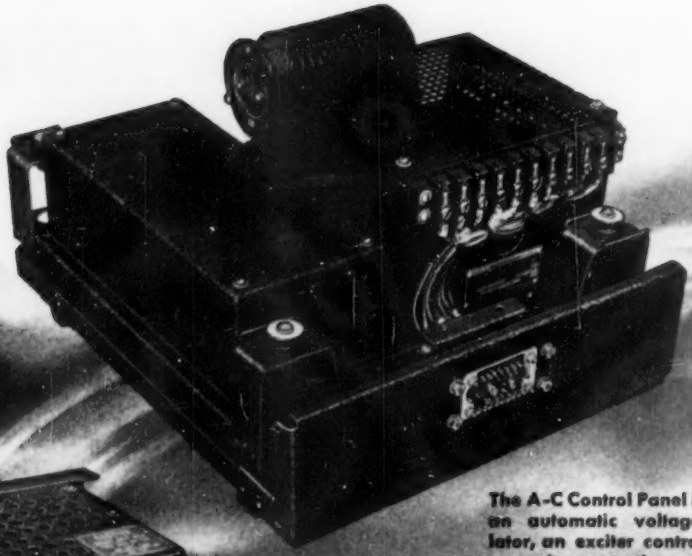
Cessna Aircraft Company
Dept. AW-2
Wichita, Kansas

Please send information on the new Golden Year Cessnas. I am interested in a Cessna 170____, 180____, 190 Series____.

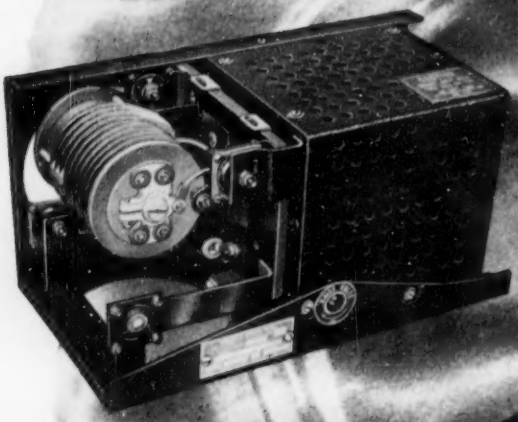
Name _____

Address _____

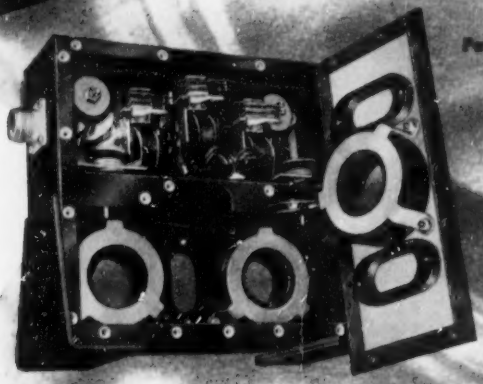
City _____ State _____



The A-C Control Panel includes an automatic voltage regulator, an exciter control relay, an exciter protection relay, and three differential current protection relays.

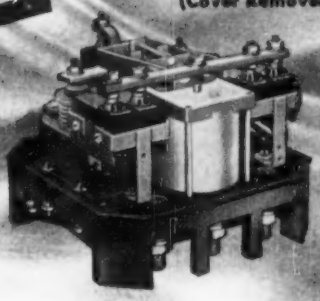


Aircraft alternator voltage regulator

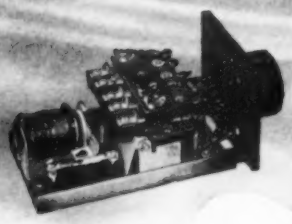


Partially disassembled differential relay protection assembly

Circuit breaker (Cover Removed)



Exciter control relay (Cover Removed)



Millions of Air-Borne Kilowatthours Protected by Westinghouse A-C Control

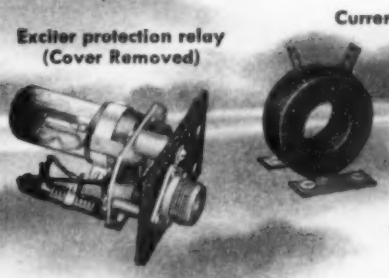
Westinghouse offers actual service-tested components for complete control and protection of a-c power systems. Exciter field relays, circuit breakers, differential relays, exciter protection relays and voltage regulators have accumulated millions of successful operating hours under flight conditions.

As individual units, or built into compact control panels, their design reflects years of engineering and operating experience.

The practical a-c system for aircraft was pioneered and developed by Westinghouse. The results of this experience in products and services are available for your applications.

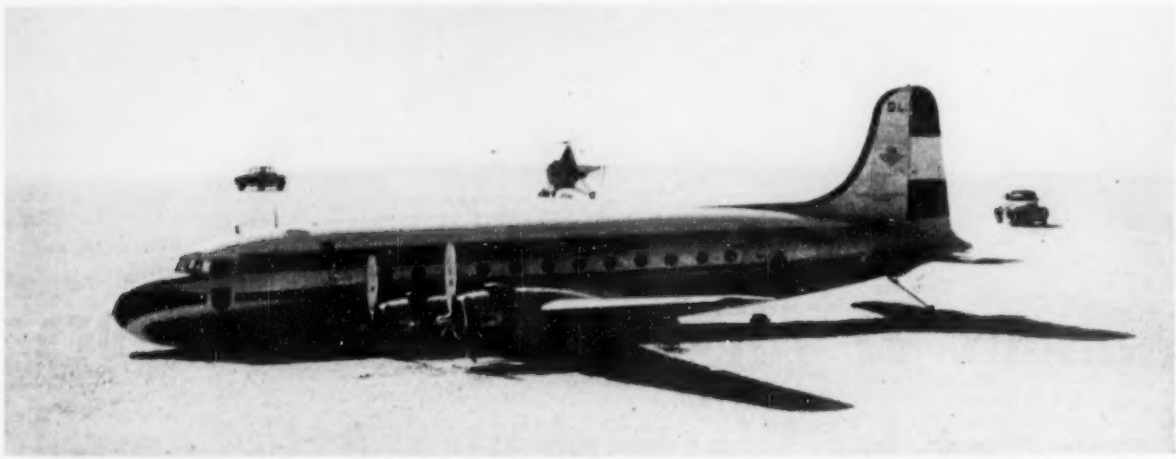
Our latest plug-in control panels, for example, offer space and weight savings, simplified airplane wiring and installation. They minimize ground time and reduce maintenance costs.

Go to the leader in aviation experience. For the best equipment and advice on a-c systems, call your nearest Westinghouse representative or write Westinghouse Electric Corporation, Aircraft Department, Lima, Ohio. J-03003



YOU CAN BE SURE.. IF IT'S
Westinghouse

LEADER IN
AVIATION EQUIPMENT



1. FORCED DOWN in desert, KLM DC-4 escapes damage, save for . . .

2. BENT PROPS, but rescuers need . . . 3. INFLATED BAGS to free gear and . . .

KLM Saves Sand-Bound DC-4 in Desert

(McGraw-Hill World News)

Dhahran, Saudi Arabia—These pictures show how KLM Royal Dutch Airlines, with a big assist from Arabian American Oil Co., salvaged a belly-landed DC-4 from the Saudi Arabian Desert 17 mi. from Dhahran Airport.

The plane ran out of fuel when bad weather closed in its destination, Basra, and other alternate fields in the area. Only one engine was operating when the ship bellied in. None of the 66 passengers and crew was injured.

▶**Lifting It Out**—Starting with inflatable rubber lifting bags, flown in from Amsterdam with a team of four KLM technicians and a Douglas Aircraft representative, the plane was raised high enough so the landing gear could be dropped.

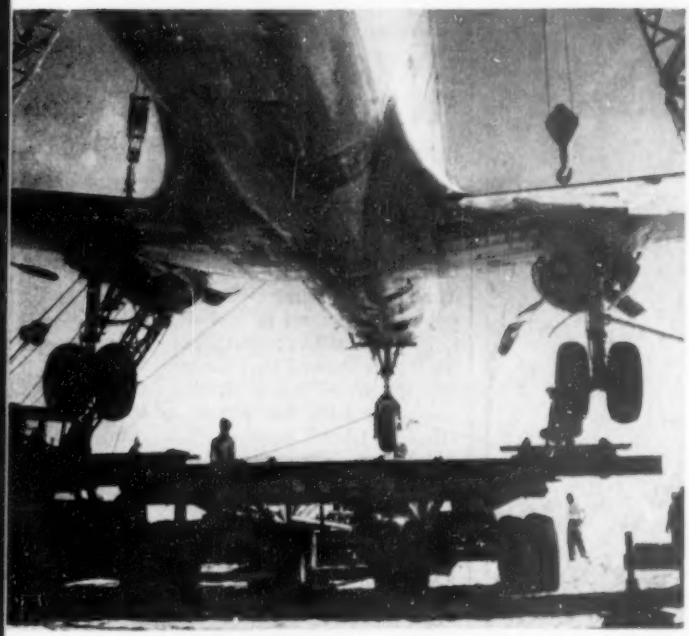
The plane was on a slope and tended to slide around as it was raised. Then the landing gear doors were found to have been jammed by the belly landing. It took a day to free them.

Finally three Aramco cranes, two using special fittings attached to the inboard engines, the other working on the nose, lifted the 40-ton aircraft and loaded it on a giant house-moving trailer provided by Aramco. The Kenworth-powered trailer moved across the loose desert sand, which had bogged down some 25 would-be rescue cars (another 15 did get through).

Additional problems were presented by a brisk north wind which lurched the plane on its moving perch, by an oil pipeline the trailer had to get over, and an electric power line it had to get under. But these hazards were passed and the aircraft was soon rolled onto an apron next to Aramco's hangars. Technicians hoped to have the plane flying soon, as the damage was slight.

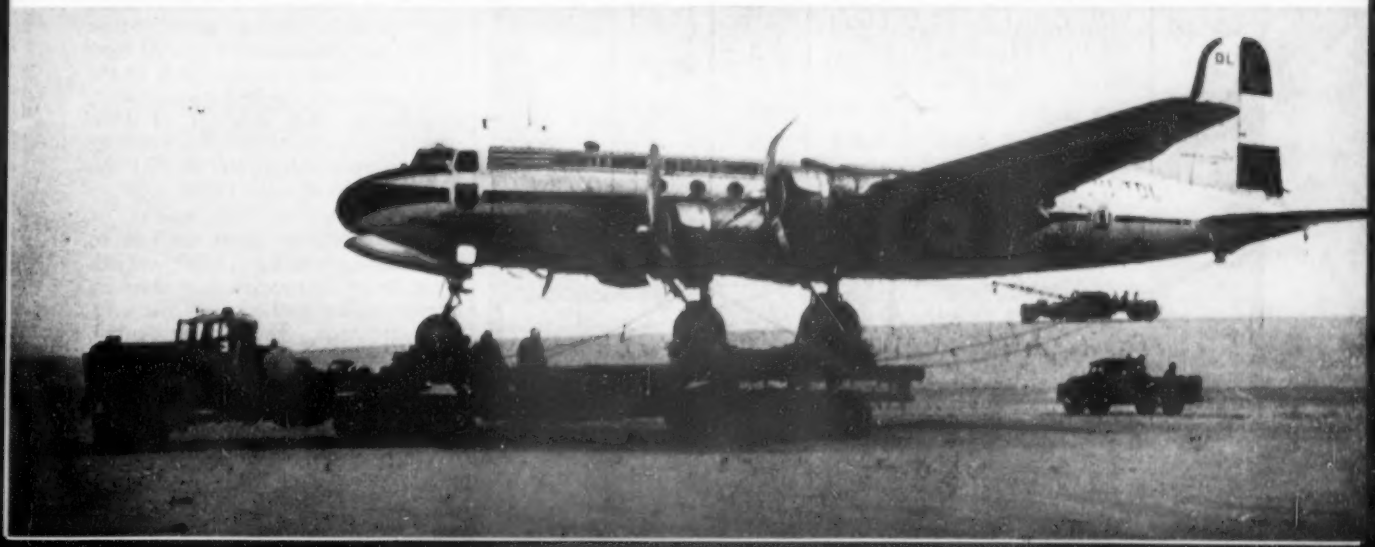
▶**How It Happened**—The DC-4, operating as a charter flight from London to Karachi with 56 passengers and a crew of 10 was flying the Rome-Basra leg of the journey. Basra was "socked in" and

4. **THREE CRANES** to hoist plane onto huge Aramco trailer, with . . .

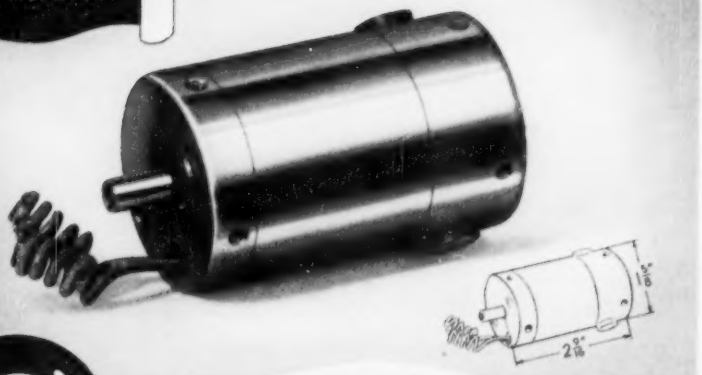


5. **EXTENSIONS** at sides to anchor wheels of disabled plane for . . .

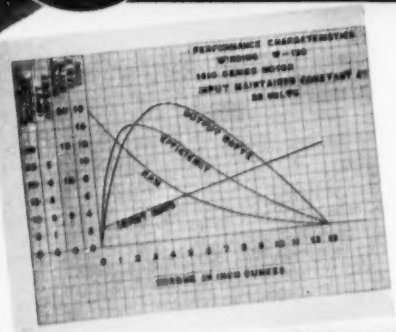
6. **MOVING OUT** on four-mile trek for nearest road to the airport.



MOTOR DATA
No. 125



EICOR 1600 FRAME MOTOR
Torque 4.5 in. oz. at 5800 RPM



The power output of this precision motor is exceptionally high in proportion to its light weight and small size. Originally developed for numerous aircraft and portable applications, the characteristics of its performance can readily be modified for a variety of new uses.

FEATURES

ELECTRICAL	MECHANICAL
Series or shunt wound	Completely enclosed
Unidirectional or reversible	Adaptable for any mounting
High starting torque	Laminated field poles
Low starting current	Stainless steel shaft
Low RF interference	Two precision ball bearings
Armature and field windings	Mica insulated commutator
Varnish impregnated and baked	Permanent end play adjustment

1600 FRAME MOTORS		Series	Shunt
Watts Output, Int.	(max.)	22	
Watts Output, Con.	(max.)		5
Torque at 8500 RPM	(in. oz.)	3	
Torque at 5800 RPM	(in. oz.)	4.5	1
Lock Torque	(in. oz.)	12	3
Volts Input	(min.)	5	5
Volts Input	(max.)	32	32
Shaft Diameter	(max.)	.250"	.250"
Temperature Rise		50°C.	40°C.
Weight		12 oz.	12 oz.

Eicor, Inc. 1501 W. Congress St., Chicago 7, Illinois
DYNAMOTORS · INVERTERS · ELECTRONIC CONTROLS · ALTERNATORS · MOTORS

had no GCA facilities. After making several unsuccessful passes at the field, the plane proceeded northwest to Baghdad. When radio contact was established half way to Baghdad the crew learned that this airport also was weathered in.

The flight was diverted to Dhahran, 315 miles southeast of Basra.

Just before 2 am. on Jan. 2, as the lights of Dhahran Airport showed through the darkness, the plane's tanks were running dry, and the engines started dying, one by one. With only one engine running, the pilot set the big ship down among the sand dunes. Only minor damage was done.

Alerted by DC-4's radio operator, a USAF plane parachuted a doctor and radioman at the site within 20 minutes of the accident. They were followed shortly by an Air Sea Rescue Service helicopter.

All passengers were evacuated to Dhahran Airport from where they were flown on the same day to Karachi via other KLM aircraft.

OFF THE LINE

More people use the expression "METO power" than seem to understand it. A quick check with companies in the New York area showed that the engineering department of one of the large engine firms translates the phrase as "mean effective takeoff power." The airlines did better. They all agreed it meant "maximum except takeoff power."

A 16% jump in maintenance and overhaul workhours was performed by Lockheed Aircraft Service, Inc., in the first nine months of 1952 as compared to the same period in 1951. More than 950 commercial and military planes were handled in the 1952 period. At Burbank, approximately 55% of the company's effort was devoted to modification of jet fighters, 35% to overhaul and conversion of four-engine transports and 10% divided between executive-type aircraft and non-aviation work. At New York International Airport, 88% of the workhours were for line maintenance, modification and overhaul of four-engine transports, and 12% on maintenance of twin-engine commercial transports and executive aircraft.

Dallas Airmotive's recent contract to overhaul Ozark Airlines' R1830 engines brings to six the number of local service operators who are Dallas' engine overhaul customers. The others: Central, Lake Central, Mohawk, Pioneer and Southern. Dallas' 1952 production showed a 125% jump over 1951.

20th Annual "Inventory of Air Power" COMING MARCH 2nd

No. 1 Aviation Advertising Opportunity of 1953

This is the established Yearbook of Aeronautical Business. More aviation men will read this issue . . . more aviation suppliers will advertise in this issue . . . than in any aviation magazine of the year. As a manufacturer, it offers you a prime medium for informing the entire industry, civil and military, of your products and services. Note below the resume of major subjects to be included in this report by the editors of AVIATION WEEK.

MILITARY AVIATION – On-the-spot reports from Korea by AVIATION WEEK's correspondent will provide a picture of Military Aviation in action. This section includes design requirement data, information on the current program and production progress.

GUIDED MISSILES – The great progress that has been made in this rapidly developing Aviation Field by the Industry and Air Force will be reported in detail. Approved information will also be incorporated in special first hand reports by AVIATION WEEK Editors.

PRODUCTION FOR AIR POWER – World requirements and commitments plus the growing program of the U. S. Air Force indicate the huge production task now being fulfilled by our Manufacturing Industry. The Inventory Number will analyze our production picture.

AVIONICS FOR AIR POWER – With Avionics furnishing the brains, the eyes and ears of today's Military Air Force, this constantly developing 100 percent Aeronautical Market will come in for special attention in the "Inventory of Air Power" issue.

NORTH ATLANTIC AIR POWER – The NATO build-up in terms of Air Power imposes additional and heavy loads upon our productive capacity. McGraw-Hill correspondents in the key cities of these nations will report and interpret each nation's requirements.

RESEARCH – What is the Research budget? What are the chief areas of Research? What is the trend of expenditures? What new facilities are needed? The 1953 "Inventory of Air Power" issue will examine Aeronautical Research and report on these questions.

COMMERCIAL TRANSPORTATION – The vast, ever-growing Transport Industry which is fast changing the traveling habits of the world's people will be given a special section for detailed analysis. The latest information and statistics will be a part of this section.

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AVIATION WEEK

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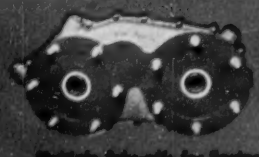
LOOK TO THE SKY FOR YOUR MARKET

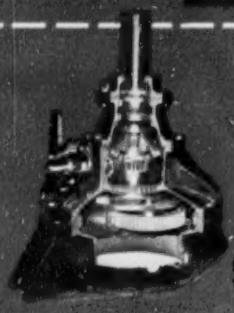
IN-FLIGHT EQUIPMENT

ACCESSORY DRIVES

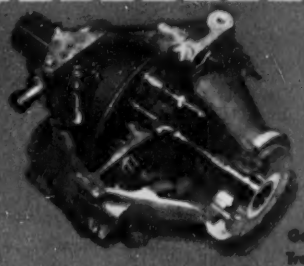


Multiple Takeoffs for Engine Accessories

SPECIAL GEAR DRIVES



Helicopter Transmission



Gas Turbine Transmission

PRECISION GEARS

Precision Gears for Every Requirement

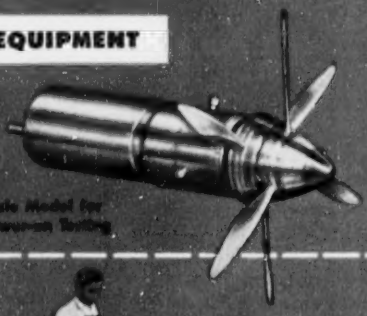
AIRCRAFT ACTUATORS

Dual-Powered Actuator

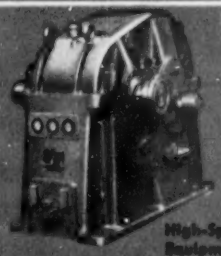
Rotary Canard-Door Actuator

GROUND EQUIPMENT

TESTING

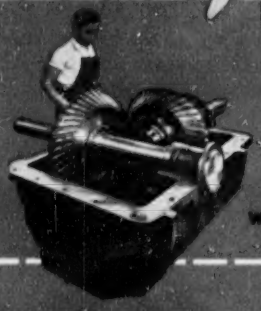


Scale Model for Powerplant Testing



High-Speed Test Equipment

WIND TUNNEL EQUIPMENT



Wind Tunnel Drive

Wind Tunnel Thrust Actuator

THESE ARE BUT A FEW examples of Western Gear service to the aircraft industry. A complete line of standard speed reducers and high-speed units is offered as well . . . for application to plant equipment.

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NEW AVIATION PRODUCTS

British Camera

New British camera, Auto Mark 3, developed for aircraft instrument recording, has other engineering and industrial uses, including time-lapse photomicrography, its maker says.

Operation is fully automatic, up to 4 frames per second at five shutter speeds from 1/10 to 1/200 sec., in addition to "time" setting. Film capacity in special cassettes is 21 ft. in two models of the camera, one providing two hundred 1x1-in. frames, the other three hundred ¾x1-in. frames. Spring motor operation is initiated by electrical impulse.

Built by D. Shackman & Sons, Ltd., London, the camera is being marketed in this country by J. A. Mauer, Inc., 37-61-31st St., Long Island City 1, N. Y.

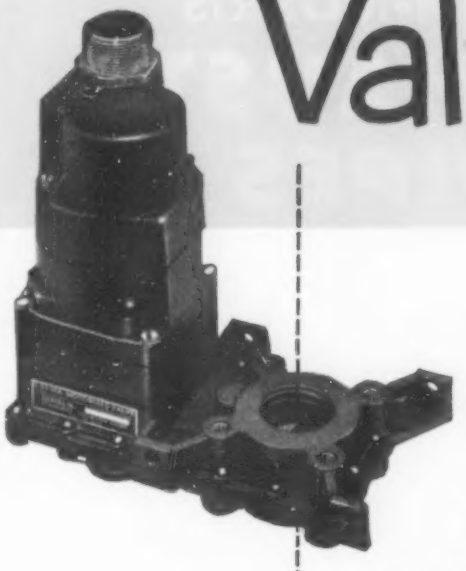
Brake-Press Unit

A new multi-purpose machine, designed to combine the functions of the press brake and stamping press in one unit and to meet nearly all production requirements in sheet metal work of this nature, has been introduced by the Cyril Bath Co.

The 150-ton brake is fitted with a 30-in. bed width found in larger presses, can do blanking, piercing, shallow drawing, bending, trimming, punching and other jobs at rates up to 60 strokes per minute if the work is light, or 45 per minute in heavier jobs. It will form

Standard-Thomson

Shut-off Valves



- Wear-saving, retracting seals
- Override for positive positioning of gate
- Simple, one-direction actuator

For fuel and hydraulic systems, Standard-Thomson Shut-Off Valves give three major advantages:

1. Standard-Thomson combines the proved sealing power of soft, synthetic rubber with a unique wear-saving device. During the entire valve cycle, the seals are *mechanically retracted*. The moving gate does not wear or bear on the seals.

2. For positive positioning of the gate, the unit embodies a *mechanical override* which disengages the actuator in full-open or full-closed position.

3. Use of a *uni-directional*, planetary gear actuator makes possible important savings in the design and cost of switching mechanism and motor.

Standard-Thomson Shut-Off Valves are furnished in diameters of 1″ to 3″, including a manually operated 2″ unit. The basic design can be adapted to shut-off service for any medium. For details, write:

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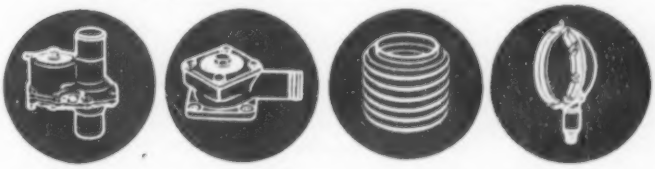

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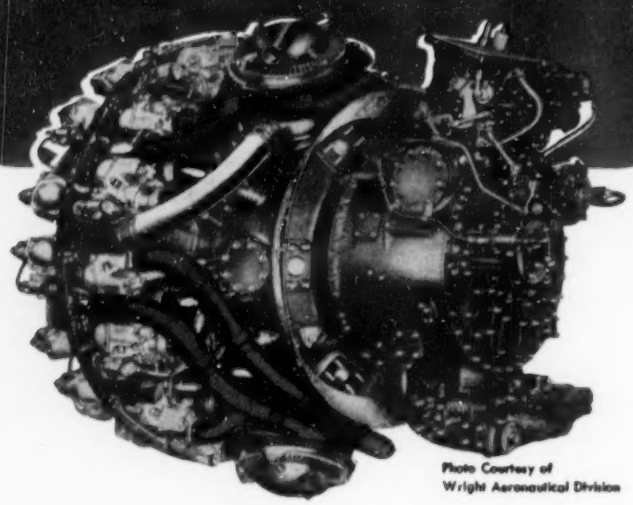

Photo Courtesy of Wright Aeronautical Division

The old saying "A chain is no stronger than its weakest link" might easily be the axiom of aircraft design. No unit of the compound reciprocating engine is more significant for its efficient service than the lowly exhaust pipe.

Smith-Morris is proud of its contribution to the success of the Wright Turbo-Cyclone "18". In the field of high temperature sheet metal fabrication Smith-Morris quality assures dependable and trouble-free service. Our experience may offer a solution to your fabrication problem.

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mild and stainless steels as well as non-ferrous metals.

Pneumatic controls permit continuous operation or automatic stop at top of the stroke. The machine can generally speed production by use of serial forming or cutting operations, Bath says. In this, the work moves progressively over a series of dies, each die performing one of the steps. Since all dies are under the single ram, one stroke performs a number of operations. End feeding, important in this operation, is facilitated by openings in the frame at both bed ends of the machine. Bed lengths up to 12 ft. are available.

The Cyril Bath Co., 7045 Machinery Ave., Cleveland 3, Ohio.

Easy Access Door

Small access holes with ready-made covers on doublers which can be riveted to sheet metal panels are being marketed by Hartwell Aviation Supply Co.

The unit's flush doors are released by a quarter turn of a screwdriver, and an additional quarter turn automatically raises the door out of the cutout to remove.

These removable plates can facilitate maintenance and inspection of vital parts. Diameter of access doors now produced is 1¾ in. in various metals with weight from 0.33 to 1.15 oz.

Hartwell Aviation Supply Co., 9035 Venice Blvd., Los Angeles 34, Calif.

Drafting Simplified

Specially lined Dimetric Graph sheets to help aircraft draftsmen do axonometric drawings are being marketed by John R. Cassell Co., Inc.

The graph is based on an exact mathematical calculation and is part of

Aeroproducts reports...

AEROPROPS KEEP GOING DESPITE SEVERE FLAK DAMAGE

OFFICIAL U. S. NAVY PHOTO

Lieutenant (jg) Robert C. Notz, USN, inspects the Aeroprop blade that brought him safely back from a North Korean target. Flying from fast carrier Task Force 77, Lt. Notz' AD fighter-bomber was hit by Red flak during a low level attack. A bite approximately 18 inches long was taken out of the trailing edge of the blade deep into the rib section. The blade remained intact and enabled him to reach a repair base. A new Aeroprop blade was installed without removing the propeller and the ship was returned immediately to combat.

OFFICIAL U. S. NAVY PHOTO

Now Lieutenant Commander Lynn DuTemple knows why his AD *Skymaster* raised such a howl when he brought it aboard the USS *Princeton* off Korea. A 37mm enemy anti-aircraft shell had torn a gaping hole completely through one blade of his Aeroprop. LCdr DuTemple had just completed his fourth bombing run on Hamhung railroad bridge when the flak ripped through his prop blade and shattered his canopy. The pierced Aeroprop blade did not alter its performance enough to reveal the damage until the plane had reached its carrier base.

THESE INSTANCES OF COMBAT DAMAGE EXEMPLIFY THE DURABILITY OF AEROPROPS . . . THE METICULOUS ENGINEERING AND CAREFUL FABRICATION OF ALL AEROPRODUCTS PROPELLER EQUIPMENT. THIS SAME SERVICE . . . AND THE "VISIONEERING" FOR AIRCRAFT OF THE FUTURE . . . ARE AVAILABLE TO ASSIST YOU WITH ANY PROPELLER PROBLEM IN THE SUBSONIC, TRANSONIC OR SUPERSONIC RANGES.

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A telescriber is a communication instrument which instantly transmits messages in the sender's own handwriting, from one point to one or more remotely located stations.

WHERE Are Telescriber Systems Used?

In any organization (regardless of size) where there is a need for instant, frequent, accurate written contact between departments or buildings.

ARE ALL Messages Received at Each Remote Station?

Selector keys permit complete system flexibility. Messages are received only by those stations chosen by the writer. All messages and signatures are in the same handwriting as the original.

CAN BUSINESS Forms Be Used in the Telescriber?

Yes. The TelAutograph 'Instan-Form' telescriber is available where *instant* communication on business *forms* is desired.

WHAT ARE Some Accepted Uses of TelAutograph Telescribers?

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CAN WE Determine Whether a Telescriber System Would Improve Our Operation?

A "Communications Guide" is available without cost to aid you in analyzing your different communication problems. For information, send your request to Department R-32 at the address below.

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NOW! THE **C•P•I** NEW 2-WIRE TYPE
super high temperature THERMAL SWITCH

ASA-21-2, two wire, non-grounded type super high temperature switch, operates under all aircraft shock and vibration conditions. Designed for extremely high temperature applications. Maintains set calibration for 100 hours at 1500°F with a variation of only 10°F. Available normally open or normally closed. Write for catalog.

CONTROL PRODUCTS • INC
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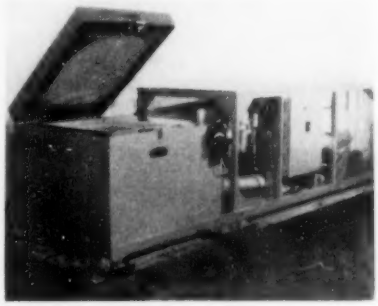
the firm's line of isometric and dimetric ellipse stencils and other accessories, all intended to facilitate axonometric drawing.

The graph lines can be followed for sketching, but do not reproduce, leaving only the drawing visible on the blueprint or black and white print. A 50-sheet pad of 8½x11-in. sheets sells for $2.75.

John R. Cassell Co., Inc., 110 W. 42 St., New York 18, N. Y.



Cold-Treat Unit

Metals may be cold-treated at temperatures of −200F and lower in a new line of industrial freezers produced by Bowser Technical Refrigeration, Terryville, Conn.

The company says cutting tool life is boosted as much as 500% by increasing hardness through cold treatment; distortion and cracking caused by grinding is eliminated, and dimensions of precision parts, gages and tools are permanently stabilized.

Factory tests also have shown that cold treatment aids expansion fitting and permits salvage of off-size parts, Bowser reports.

Hydraulic Spring

A cylinder-piston spring—claimed to produce 600% more pressure than conventional coil springs of the same size—has been developed for production machines by Wales-Strippit Corp., North Tonawanda, N. Y.

Known as the Wales Hydra Spring, the unit contains a compressible fluid that provides pressures up to 3,800 lb. The Wales Comproils fluids, compounded for the spring, can be compressed up to 10% at maximum load. Lubricity has been taken into account in the fluids, the company says.

Hydra Springs may be used in hole-punching machines to return the die and strip away punched material. The springs also may be used in machine tools, plastic injection dies, and to cushion thread rolls.

Most models of the Hydra Spring are no larger than 2x4 in., but the unit delivers pressure equal to that of a railcar coil spring, Wales says.

for example,
GRUMMAN F9F PANTHERS...
on the assembly line at the Grumman plant at Bethpage, New York.

Land and carrier-based jet fighters in service with the U.S. Navy and Marine Corps, Grumman F9F Panthers are shown above on the assembly line at the Grumman Aircraft Engineering Corporation Plant at Bethpage, Long Island, N.Y. Panthers like these recently established a milestone in aviation history by landings of jet aircraft aboard Naval aircraft carriers.

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ALSO ON THE MARKET

Longer life for single-point tungsten carbide cutting tools is realized by sharpening at first signs of dullness with new hand hone between cuts, according to Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.

Increased tensile strength and better resistance to flexing fatigue reportedly has been achieved (with a reduction in weight) by means of new double-overlap construction in Flexaust spiral-wire-reinforced flexible hose produced by American Ventilating Hose Co., 100 Park Ave., New York.

Locknut with spring steel insert that can be hot-dip galvanized to resist alkali, salt water and other damaging elements has been announced in ⅜-in. to 1⅛ in. sizes by Security Locknut Corp., North Ave. & 15 Ave., Melrose Park, Ill.

Recirculating valve that can be used for stream flow dividing of gases, air, salt water, oil and mild chemicals to pressures of 125 psi. has been announced by Ardee Mfg. Co., 840 N. Seward St., Los Angeles 38.

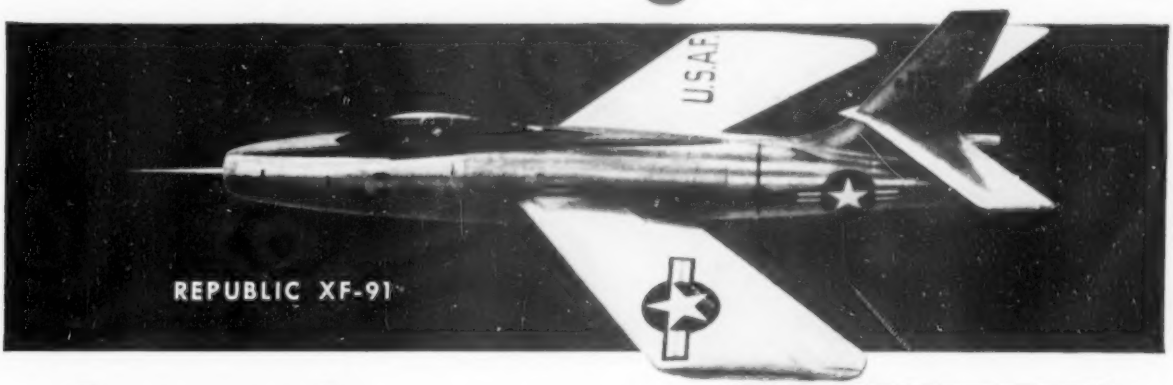
Welding transformer giving stepless current selection from 40 to 375 amp. for a wide range of applications, from light-duty, low-current sheet metal work to heavier-duty, high-current industrial jobs, has been announced by General Electric Co., Schenectady 5, N. Y.

Rotary table for machine tool work of 24-in. diameter can be rotated through 360 deg. in either direction and tilted to 90 deg. by pushbutton. Sine bar method is used when highest precision is desired, providing accuracy in seconds up to a 45-degree elevation, company says. Table is described as "exceptionally compact" by maker, Pratt & Whitney Division of Niles-Bement-Pond Co., W. Hartford 1, Conn.

Portable, wide-range flow test kit for laboratory research and field flow-checking work is being marketed by Fischer & Porter Co., 745 Jacksonville Rd., Hatboro, Pa.

Battery AD-X2, additive said to prolong lead-acid battery life, is made by Pioneer, Inc. Pioneer claims that conclusive tests made by MIT at request of Senate Small Business Committee disprove previous unfavorable review by National Bureau of Standards. Complete report is in Release SSB 109, obtainable from Senate Select Committee on Small Business, 131 Indiana Ave., N. W., Washington, D. C.

Variable Wing Incidence



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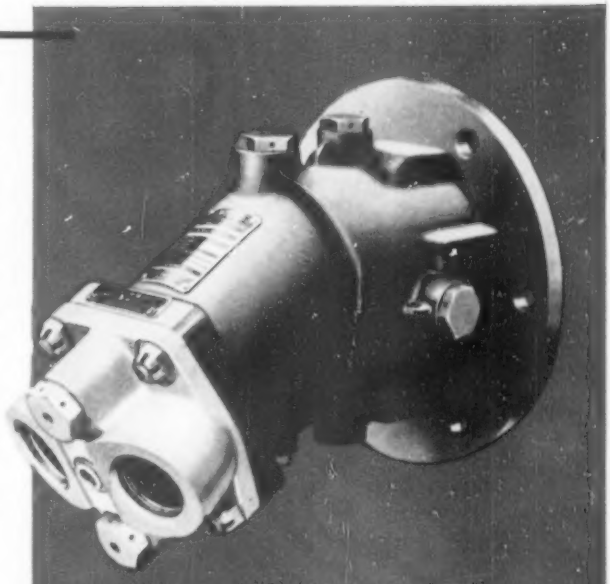
For the first time, in Republic's new XF-91 Interceptor, the wing incidence is *adjustable in flight* by the pilot to provide a high angle of attack for low takeoff and landing speed . . . a thin razor-like attack angle for extreme flight speed.

The heart of the adjustment gear is a Vickers MF-3915 Hydraulic Motor which drives a screw jack to do the wing positioning. Characteristics provided by this motor are essential to the success of the mechanism. The extremely low inertia of the moving parts gives this motor the instant response vital to exacting flight conditions without the need for an auxiliary clutch or brake. It can be started, stopped and reversed almost instantaneously and no excess energy absorbing device is necessary. This permits elimination of over-run, and exact positioning of the wing. Other important characteristics of this motor, not generally available by other means, are exceptionally high torque, lighter weight, remarkable compactness, freedom from radio interference, ability to stall indefinitely without damage, easy installation and unusual dependability.

Vickers Hydraulics have helped make aviation history for years in both military and commercial planes. Write for new Motor Bulletin 5205.



Vickers Model MF-3915 Series

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FINANCIAL

Trusts Show Big Shift to Aircraft

Aviation Week study finds funds going heavily into airframe securities while dropping airline stocks.

An AVIATION WEEK study of aviation and general-type trust portfolios for 1952 reveals:

- **Major shift to aircraft manufacturing shares.**
- **Liquidation of air transport securities.**

▶**National**—The most interesting account is presented by National Aviation Corp., the largest and most successful of the specialized aviation funds. At Dec. 31, 1952, net assets of this trust aggregated more than $10.5 million, up slightly from the 1951 year-end to the highest point in the postwar period and exceeded only by the 1945 year-end valuation of $13.3 million.

This valuation excludes any consideration of dividends, totaling more than $4.2 million or $9.45 per share, paid during the past seven years. The capitalization has remained unchanged throughout, with 446,476.60 shares outstanding.

Aircraft shares comprised 63.1% of the fund's total assets at Dec. 31, 1952. This rise from the 42.7% a year earlier helped boost the trust's aircraft holdings to their highest concentration in the postwar year-end valuations.

Airline holdings, by contrast, down to 33.7% at Dec. 31, 1952, from the 52.2% of a year earlier, were at the lowest point in the last seven years.

▶**Price Appreciation**—The aircraft portfolio had cost around $4.3 million, but its Dec. 31, 1952, market valuation was $6,645,325, reflecting considerable unrealized price appreciation. Airline investments reflected a much smaller unrealized enhancement, with a total cost of slightly more than $3 million but a market valuation of about $3.6 million.

During 1952, adjusting for all stock dividends, National Aviation sold 600 Bell, 5,500 Grumman, and 500 Lockheed. Acquisitions were represented by 6,800 Bendix, 1,200 Boeing, 1,500 Douglas, 9,000 Garrett, 7,500 North American, 5,000 Republic, 500 Thompson Products, 2,500 United Aircraft, and $68,000 in notes and 10,000 warrants of the Glenn L. Martin Co.

Selling in 1952 was pronounced in the airline group, through liquidation of 7,500 American common and 300 preferred, 15,000 Braniff, 9,000 Delta, 13,500 Eastern, 10,000 TWA, and 27,900 United Air Lines common. The only airline purchases were 2,500 Chicago & Southern, 2,500 New York Airways, and 2,300 United Air Lines preferred. However, National bought $105,000 Mid-Continent debentures (now assumed by Braniff).

▶**National's Year-End Holdings**—Giving effect to all of these transactions, National Aviation's aircraft portfolio at the 1952 year-end consisted of: 29,400 Bell, 6,800 Bendix, 17,500 Boeing, 10,000 Curtiss-Wright A, 10,000 Douglas, 16,000 Garrett, 8,500 Grumman, 24,750 Lockheed, 37,500 North American, 27,500 Republic, 9,500 Thompson Products, 20,000 United Aircraft, $68,000 in notes and 10,000 warrants of the Glenn L. Martin Co. A profitable specialty is further represented by 2,400 Greer Hydraulics preferred.

From the standpoint of dollar value the largest commitments were in United Aircraft ($760,000), Boeing ($704,375), and Bell ($632,000).

Airline investments at Dec. 31, 1952, were represented by the following: 20,000 American common and 10,700 preferred, 10,000 Braniff, 20,000 Chicago & Southern, 11,000 Delta, 11,500 Eastern, 10,000 Helicopter Air Service A, $300,000 Mid-Continent 4½% debentures, 2,750 New York Airways, 25,000 Pan American, 16,500 United Air Lines common and 2,300 preferred. Also, 10,000 Air Express International Agency, Inc.

In the airline group the largest individual company dollar investments were represented by American ($1,148,325), United ($724,760), and Chicago & Southern ($407,500).

▶**High Dividends**—An interesting aspect of National Aviation Corp.'s performance is the high dividend income afforded its stockholders.

For 1952 and 1951, total dividends, amounting to $2.40 per share annually, represent an average return of about 10% on recent market quotations of the National Aviation shares. Of course, this is a reflection of the high income-producing qualities of its portfolio, primarily the aircraft securities. (The nature of liberal aircraft income yields was discussed in AVIATION WEEK Jan. 5, 1953, p. 18.)

While dividend and interest income average about $524,000 annually for 1952 and 1951, or around 5% on its total assets, National Aviation demonstrated excellent results in achieving capital gains during the same periods. Profits from this source on a tax basis were $669,973 in 1952 and $682,912 in 1951. Such favorable results appear to be more the product of good managerial direction than the happenstance of any diversification which exists in the industry.

▶**Other Trusts**—Mere diversification is not always a sure key to successful aviation investments. For example, for a number of years Aeronautical Securities, Inc., was operated as a specialized trust. Despite a wide variety of selections within the aviation industry, the results evidently led the sponsors of this $1-million trust to liquidate and convert into a general-type fund last November.

Another specialized trust still remaining is the Aviation Group of Institutional Shares, Inc. At Nov. 30, 1952, total assets of this fund aggregated about $1.8 million, including 68% in aircraft shares and 25.3% in the airline category. Principal additions during 1952 include 1,900 Boeing, 2,340 Martin, 1,200 North American, 1,920 Piasecki, and 2,720 Solar. Issues sold last year included 1,000 Douglas, 4,300 Fairchild Engine, 2,200 Northrop.

Among the airlines, the issues sold were confined to 3,500 American, 400 Eastern, and 100 United. Additions were represented by 100 Capital and 800 Delta.

Among the general-type trusts reporting thus far, the pattern has been to acquire a few aircraft shares while liquidating airline equities.

The largest fund, Massachusetts Investors Trust, bought 1,400 Douglas, 10,000 North American, and 11,000 United Aircraft during the last quarter of 1952. At the year-end this fund held a total of 16,400 Douglas, 60,000 North American, 55,000 United Aircraft, and 20,000 Grumman. Total MIT aircraft commitments have a current market valuation of almost $5 million.

While other general funds are becoming less timid about making aircraft investments, there is no great stampede in this direction. Air transport securities, despite improved airline earnings of recent years, are in decided disfavor among professional money managers representing general investment trusts.

—**Selig Altschul**

Stock Dividends Declared

Two airlines and three manufacturers recently declared regular quarterly dividends ranging from 10 to 35 cents for each share of common stock.

Stewart-Warner Corp., Chicago, declared the highest dividend of 35 cents per share of $5 per value capital stock. Others were United Air Lines, 25 cents; Delta Air Lines, 25 cents; Airfleets, Inc., San Diego, 25 cents; and Ryan Aeronautical Co., San Diego, 10 cents.

So. American Route Fight Up to President

- **CAB turns over case for two parallel New York-South America interchange route agreements.**
- **But EAL-PAA group wants to re-argue Board denial of voluntary contracts between large carriers.**

By Lee Moore

Decision as to which airlines shall join routes to give through service from New York to South America is now up to President Eisenhower. He either must approve or disapprove a Civil Aeronautics Board decision against permitting Eastern, Pan American and Panagra to execute their equipment interchange contract.

There have been no outward indications as to how the President may decide this case. It is so controversial that President Truman pigeonholed it for a year and finally sent it back to CAB unsigned before he left office. Now CAB has tossed it back to the new President. The Board does not want the tedious job of reargueing the whole case, although the Eastern-Pan American group has petitioned for reargument.

In this so-called Balboa Service Case, the Board urges two parallel interchange route agreements, Eastern-Braniff and National-Pan American-Panagra—two ways to bring one-plane service from northeastern U. S. to western South America, via equipment interchange between the airlines at Miami. The Board has denied approval of the voluntary agreement of Eastern, Pan American and Panagra on grounds that lineup would ally the larger companies, Eastern and Pan American-Panagra, in competition with National and Braniff.

The Board says it has power to deny such voluntary charter agreements as a part of its policy to promote a "balanced" competitive-route system. However, industry observers say there is legal question as to whether the Civil Aeronautics Act gives the Board power to deny interline equipment charter contracts only on grounds two companies happen to be big.

▶**CAB-White House**—Terms of the CAB decision and their transmittal to the President theoretically are confidential. But for about a year Washington observers have understood that the Board had ruled against the Eastern-Pan American-Panagra contract. Confirmation of this fact was inherent in petitions of these three airlines for reargument of the case—after President Truman left office without having acted on the CAB decision.

The Board decision, if approved by Eisenhower, would in effect try to compel Pan American to execute a "voluntary" contract with National. The Board overruled the recommendation of examiner T. L. Wrenn, who argued that the Eastern-PAA-Panagra agreement should be approved, since he could see no clear violation of the public interest in the agreement.

CAB denied Pan American's and Panagra's petitions for re-argument. Eastern filed its petition "after the Board had taken action," a CAB source said. Denial of Eastern's petition as soon as the Board opinion-writing division could process it was expected momentarily last week.

The airlines now must deal directly with the White House in trying to make their arguments for and against the CAB recommendation.

▶**Opposition**—Pan American president Juan Trippe has been adamant in opposing CAB efforts to have PAA contract with National, because he and National president G. T. Baker disagreed over interpretation of terms of a similar interchange contract they had signed two years ago.

Pan American, Panagra and Eastern have submitted petitions for reargument of the case on grounds the situation has changed since the Board made its original matchmaking decision. Both National and Braniff have grown to maturity, they say. National now is financially powerful and operates one of the most lucrative routes in the hemisphere; Braniff also has gained new size and potential through traffic gains and merger with Mid-Continent.

Furthermore, the initial decision of examiner Wrenn ruled that a voluntary charter contract of this type must be approved unless it is found definitely contrary to the public interest. The burden of proof is on the Board, not the carrier, in interline charter contracts.

In effect, the New York-South America interchange agreements are equipment charters. Eastern and National carry passengers to the Miami gateway to Latin America. They land and refuel. Then Braniff and Panagra crews fly the same planes on to Balboa and points south. The planes must stop at Miami anyway, so this one-plane arrangement is little different from an interline transfer of passengers to another plane. The through trip is so long that little if any improvement in time or connections is gained through interchange.

Main advantage is in increased promotion and advertising of the one-plane service, since National and Eastern could now advertise that it is in effect their own service to South America, and the Latin American operators likewise could now promote "direct" service to the U. S. East Coast.

▶**Outlook**—Some Washington observers speculated last week that President Eisenhower would follow the recommendation of the Board and approve its decision. They reason that the new President and his White House staff are too busy with more important matters to give concentrated study to the Board decision. CAB Member Chan Gurney, former chairman of the Senate Armed Services Committee in the 80th Congress, visited Eisenhower recently at the White House to brief him on Board affairs, presumably including this one.

However, some other observers believe the White House advisers will defer action, as the former President and his staff did. They may be more likely to do this if they consider the issue raised by examiner Wrenn's recommendation, which in effect said that denial of voluntary agreements in this case would be unwarranted extension of government control.

Large Nonsked Orders DC-6Bs for Aircoach

North American Aircoach Systems, largest domestic nonscheduled airline operation, has placed a firm order with Douglas Aircraft Co. for two DC-6Bs with backward-facing passenger seats, the first such order in the U. S. airline industry. Delivery date: late 1954.

The carrier also is the first domestic nonsked to order new planes, and is the first domestic airline, scheduled or nonscheduled, to order new coach planes direct from the factory. Other airlines, except Pan American, have

converted older first-class planes to coach.

North American owns and operates five DC-4s, but plans to order more DC-6Bs if it wins a route certificate from CAB. The North American operation currently grosses nearly $1 million a month in aircoach revenue.

CAB Starts Action On United Aircoach

Civil Aeronautics Board last week started formal enforcement proceedings against United Air Lines for "unfair competition" in offering what CAB considers first-class DC-4 service (fewer than 64 seats) at coach fares in violation of the carrier's filed tariff (AVIATION WEEK Feb. 9, p. 77).

But UAL president W. A. Patterson told AVIATION WEEK he will continue operating his present DC-4 coaches "indefinitely." And it will be at least mid-summer before CAB can issue a final cease-and-desist order that will stand up in court because of time required for briefs and hearings. If the Board were to issue one now, the airline could claim CAB moved arbitrarily, without a hearing.

However, the Board is expected to issue the cease-and-desist order this summer. United then can appeal the decision to a U. S. Court of Appeals and petition for stay of the order pending court review. If the court does not grant the stay, United immediately must stop DC-4 coach service altogether or comply with CAB policy requiring at least 64-passenger capacity on DC-4s to justify coach fares.

▶**Patterson Policy**—A United spokesman told AVIATION WEEK that "engineering work is in progress" to modify the carrier's DC-4 coaches from 54 seats to 58 seats—still six less than required by CAB. This is taken by Board observers as an indication that United has no intention of abandoning its stand.

Patterson recently said a congressional investigation would be a good way to settle the question of whether high-density coach seating is unsafe, as he alleges. But last week he told AVIATION WEEK that he had not directly suggested such a hearing through any congressman, and that he does not "expect" a congressional hearing.

Pioneer Exchange Report

Pioneer Air Lines gave $1,285,857 in interline exchange revenues last year and received $750,639, according to reports at a recent PAL sales meeting in Dallas. American Airlines received $536,388 from Pioneer; Eastern, $209,068; Braniff, $182,541, and Delta, $119,796.

BEA'S FIRST production model of the turbojet Viscount takes to the air as . . .

VICKERS accelerates production of the transport, with an eye on U. S. market.

Vickers Pushes Viscount Sales

With 75 orders firmed up, British manufacturer plans vigorous bid for customers among U. S. carriers.

London—An accelerated international sales campaign on its Viscount turboprop airliner is being pushed by Vickers-Armstrongs Ltd.

With a total of 75 firm orders already on the books and a score more still being contested against U. S. competition, the Viscount is looming as the most formidable of the British gas-turbine-powered competitors for U. S. aircraft in the international airline market.

Indications are that Vickers is concentrating its current sales campaign in North America where Trans-Canada Air Lines already has ordered 15 Viscounts and BOAC has ordered three more for its dollar-laden West Indian resort traffic.

▶**First View**—Most U. S. airline officials will get their first glimpse of the Viscount this winter when Vickers sends a production model to Canada for cold-weather tests of winterization modifications for Trans-Canada's operational requirements. Later, Vickers is expected to bring another Viscount to North America for a full-dress sales campaign including a U. S. itinerary.

U. S. airline passengers will get their first glimpse of the turboprop-powered Viscount in regular airline service on TCA's routes into New York, Chicago, Cleveland and Seattle sometime early in 1955. BOAC is expected to put its Viscounts into West Indian service during the same year. Only U. S. point to get service by British West Indian Airways is San Juan, P. R.

Recently George Edwards, Vickers chief designer, disclosed that the Viscount production program was being accelerated to a rate of eight a month by early 1955. In addition to the Weybridge production line, Vickers is now building major components at its

Vickers Announces Super Viscount

(McGraw-Hill World News)

London—Vickers-Armstrongs, Ltd., unveiled plans for its Super Viscount last week with announcement that British European Airways has ordered 12 for delivery in October, 1955.

The Super Viscount, designated the 800, will have a fuselage 13 ft. longer than the Viscount, boosting passenger capacity from 48 to 66 normal, or 82 high-density.

Gross weight was increased from 58,000 to 65,000 lb. This was made possible by squeezing more power out of Rolls-Royce Dart turboprops; the new RDa 5 will give 1,540 shaft horsepower and 1,690 equivalent horsepower.

▶ **Replace Elizabethans**—BEA has an option for eight more 800s. It plans to use them on short hauls—Paris-Amsterdam-Brussels. BEA contends the 800 will make the Viscount profitable on shorter routes, while the present 700 series is economical only on 500 to 800-mi. routes. This view indicates the Viscount 800 will be a replacement for the airline's Elizabethans destined for freight.

Original hope of fitting Darts to the Elizabethans has been dropped long since for lack of backing.

Orders for Viscounts now total 80. Vickers plans to produce the 700 and 800 series side by side, gambling that there will be increased demand for both.

Unique in present British practice is the fact that development costs of the Viscount 800 series are being underwritten solely by Vickers, not by the Ministry of Supply.—**N. McK.**

Hurn facility and eventually plans to set up a second line there.

Meanwhile, Vickers delivered its first production-line Viscount to British European Airways last month, several months behind schedule. BEA had expected to have a small quantity of Viscounts in service to handle its Christmas rush traffic with supplementary flights and begin regular Viscount service in the spring.

▶ **Bearing Problem**—Schedule now calls for BEA to get five Viscounts by Apr. 1, with first deliveries to Air France beginning shortly thereafter. Principal cause of the delivery delays has been difficulties with the phosphor-bronze bearings in the Rolls-Royce Dart turboprops. Rolls now has developed a cageless bearing that is expected to solve this problem.

During the development cycle the gross weight of the Viscount has risen from 50,000 lb. on the prototype to 58,500 lb. on the current production models. Seating capacity has increased from 30 to 48, with a 54 high-density arrangement possible. Power of the Dart turboprops has risen from 1,000 shaft horsepower to 1,400 in the current models, plus 365 lb. of jet thrust. In a special long-range version of the 58,500-lb. gross model developed for Trans-Australia Airways, the Viscount is expected to carry an 8,700-lb. payload over a 1,700-mi. stage length.

▶ **New Features**—Special modifications for Trans-Canada's cold-weather operations include additional electric power, better heating systems for passenger, crew and freight compartments, and methods of minimizing the effects of slush and ice lifted by retracting the landing gear during takeoff.

Vickers also is considering a freighter version of the Viscount at the request of three prospective customers.

Since the Viscount prototype made its first flight in July 1948, a total of 2,100 hr. have been flown in it, the production prototype and the first production model delivered to BEA.

Additional Viscount sales are currently being pushed in India, Germany and Holland in the face of strong U. S. competition.

PAA Sets Sights on Air Cargo Rate Cut

A 45% cut in trans-Atlantic air cargo rates for bulk shipments will be proposed by Pan American World Airways to its fellow members of the International Air Transport Assn., informed industry sources say.

The proposed reduction would put air cargo rates below those charged by surface cargo ships.

The proposal almost duplicates for trans-Atlantic air cargo a policy proposed by Pan American in 1948, advocating low-fare, heavy-volume trans-Atlantic passenger flights. When put into effect last year, trans-Atlantic passenger volume jumped 50%. PAA expects the same reaction for freight.

▶ **Based on Bulk**—Introduction of Douglas DC-6A airfreighters, with a loading door as large as a freight car's and capable of carrying 20,000-lb. loads, makes air shipment of large, bulky cargo possible.

Current trans-Atlantic cargo tariffs provide two rates—one for shipments of more than 100 lb. and the other for lots of less than 100 lb. Key to PAA's proposal, according to industry observers, will be additional "break points" for shipments of 500 and 1,000 lb.

Industry sources say Pan American will call for a 45% reduction in rates for shipments of more than 1,100 lb. This means bulk cargo lots shipped from New York to London would cost 60 cents a lb., almost cutting in half the current rate of $1.10 a lb. Small shipments would remain the same, but the low-bulk rates would encourage shippers to consolidate small lots.

▶ **South American Rates Cut**—PAA has been hauling cargo to South America at rates lower than surface transportation for the past four years, airline spokesmen say, and the low cost has encouraged shipments of more than 1,000 lb.

Informed sources say Pan American will make this proposal at a meeting of IATA's special Specific Commodity Rates Board, composed of senior traffic officials of the North Atlantic Conference of Airline Operators, to meet in New York Feb. 16.

Flying Tiger Service Speeds Parcel Post

Flying Tiger Line is handling parcel post packages for large-volume shippers in a new air service competitive in cost with regular mail rates.

The cargo carrier says the service cuts parcel post delivery time in half, yet costs only 1 to 5 cents per pound more than straight mail.

E. Kruttschnitt, western regional sales manager, says 76,000 lb. of parcel post were flown from San Francisco to Denver, Chicago and New York during the first 22-day period of the service.

The line anticipates a daily load in the San Francisco area of from 10,000 to 20,000 lb. in packages from garment manufacturers, who recently approved the service through an endorsement by the Apparel City board of directors.

Working with a consolidator, Flying Tiger airfreights packages within the size and limits of parcel post to the major city nearest the point of destination. The package is carried on its final leg by regular parcel post.

The consolidator—Air Land Freight Forwarders—picks up parcels, weighs and sorts them, and meters the packages with the postmark of the city where parcel post takes over delivery of the package.

Flying Tiger experimented with a small volume of shipping between San Francisco and San Diego before the service was enlarged to include Denver, Chicago and New York. Plans now call

for parcel post flights in Los Angeles by the end of March.

Kruttschnitt says the line received a 50% response from merchants in San Francisco on mailed advertisements of the new service.

CPA Plans Polar Run

Canadian Pacific Airlines plans to make application soon for nonstop service across the Canadian polar route from Vancouver to London, the carrier's president, Grant McConachie stated recently.

And by employing the polar route, he said, CPA can connect Asia and Australasia to Europe. South America also figures in these plans.

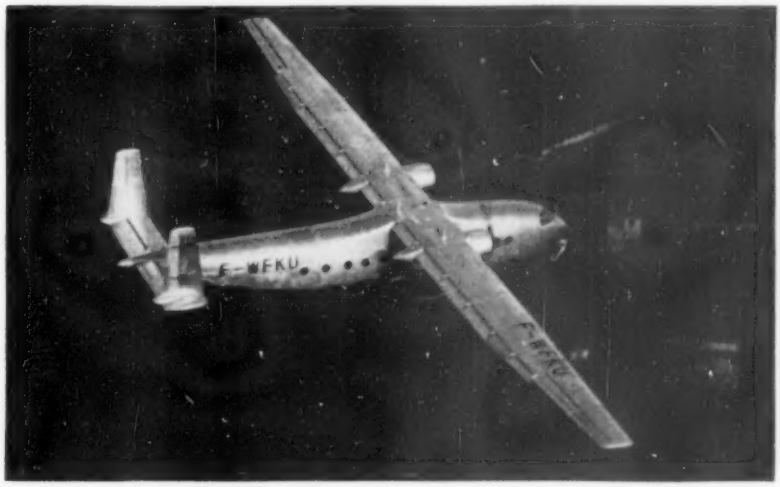
McConachie, also believes that "by the end of this decade we can expect to see 50-passenger helicopters in the air."

Capital-Western Merger Talks Denied

A swing around the West Coast last week by Capital Airlines president J. H. Carmichael gave rise to rumors of merger discussions between Capital and Western Air Lines.

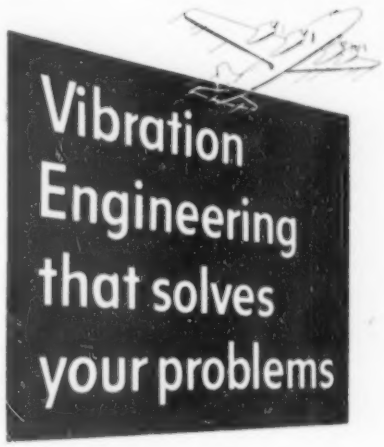
But Capital treasurer Ray Lochiel told AVIATION WEEK he had no knowledge of such discussions. Sales vice president J. W. Austin accompanied Carmichael on the trip, Lochiel said, and the major subject of discussion was interline sales.

Civil Aeronautics Board recently granted Western a route extension to Minneapolis-St. Paul, joining this system with Capital for the first time. Industry observers understand that Capital seeks merger with Northwest Airlines rather than Western.



NEW FRENCH TRANSPORTS TESTED

French activity in the transport airplane field is highlighted by these two pictures of their most recent developments. Top photo shows the new Hurel-Dubois H.D. 31 aloft and the lower view is the first photo of the S.O. 30 Bretagne fitted with two Snecma Atar turbojets. Noteworthy feature of the H.D. 31 is the high aspect ratio wing (20.2). Powered by two 800-hp. Wright C7BA1 engines, gross weight is 29,832 lb. and top speed is calculated at 174 mph. Construction is all metal. The S.O. 30-Atar will be used to test the turbojets at high altitudes as part of a jet-transport-development program. The plane previously had been flying for more than a year with Hisso Nene jets. The intakes on the side of each nacelle are for cooling the powerplants. Note the auxiliary tanks which are to be carried slung under the wings.



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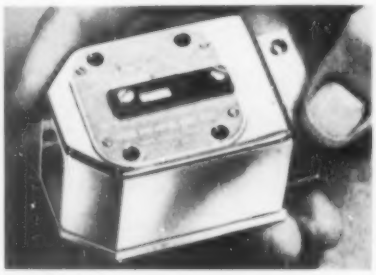

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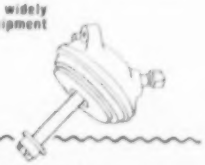

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No Shortcuts

- **CAA stands ground on Comet 3 certification.**
- **But more meetings will be held later in Britain.**

By Alexander McSurely

Efforts of the British Air Registration Board to shortcut some Civil Aeronautics Administration red tape in connection with U.S. certification of the Comet 3 jet transport were unsuccessful, it was indicated last week as Anglo-American meetings were adjourned in Washington.

However, the meetings will be resumed later this year when CAA's 12-man Turbine Transport Evaluation Team, headed by George W. Haldeman, CAA chief of aircraft engineering, goes to England.

▶**Certification Procedure**—CAA administrator Charles F. Horne announced a three-point procedure the U.S. has set for acceptance of "specific British designed and manufactured turbine-powered aircraft on an individual basis similar to that contemplated for U.S. manufactured aircraft." These are the points:

- Assurance by the Air Registration Board that the airplane complies with certain technical standards to be mutually agreed upon.
- Supplying the U.S. government with design data covering other aspects of the airplane that are not dealt with by the agreed standards, or to which the agreed standards logically cannot be applied. Concerning these areas, it would be necessary for CAA to make such decisions as are compatible with the general level of safety to be applied to domestic manufacturers.
- Examination by U.S. technicians of at least one of the airplane types during actual operation and under specified conditions.

▶**"Fruitful Exchange"**—Horne's announcement quoted him and R. F. Hardingham, head of the British delegation, as calling the meeting a "fruitful exchange of technical information."

Hardingham told AVIATION WEEK: "We have agreed on a number of things. But that is not to say that there have not been many other points of disagreement."

"The main trouble," Hardingham said, "is that we do not have a Comet 3 ready for the CAA to flight test. All that is available now is a Comet 1."

The British leader, who is secretary of the British Air Registration Board, indicated disappointment that the Washington talks had not made more

actual progress toward clearing blocks in the way of Comet certification. The Comet 3 has been ordered by Pan American World Airways. British delegates had hoped CAA would agree to outline any special U.S. requirements above the British certification requirements and allow the British agency to certify that these requirements had been met.

But the third point in Horne's procedure outline indicates CAA is continuing to insist on its independent flight test of the airplane, in addition to everything the British may do on the plane.

Horne described the Washington meetings as "part of a careful procedure aimed at eventual agreement on standards for U.S. certification of the airworthiness of jet transports, such as the British Comet."

▶**Eventual Agreement**—After similar joint discussions, Horne said CAA agreed to accept British certification of reciprocating engine aircraft, stating that these complied with British requirements and with certain stipulated U.S. requirements in addition. The de Havilland Dove, small twin-engine transport, is the only British airplane that has been certificated for use in the U.S. under this agreement.

The official statement from Horne quoted both the CAA administrator and Hardingham as reaffirming a mutual confidence in safety standards of the two countries and emphasizing that, "Undue stress on detailed technical requirements, springing from national practices rather than the needs of safety, would not be permitted to obscure this mutual confidence."

▶**Comet Criticized**—Hardingham and his three technical specialists were guests of the Washington section, Institute of the Aeronautical Sciences, during their Washington stay. At a meeting on turbine transports, the ARB secretary took issue with some U.S. government, industry and military leaders' statements about jet transports and the Comet in particular.

Discussion centered on the numerous U.S. committees, commissions and boards that have been shuffling papers on the jet transport question while the British have been cutting metal.

"It appears you've spent too much time in committees," the British official commented.

A statement by Lt. Gen. Joseph

AIRLINE OFFICERS SEE HAWAII

Pictured shortly after arrival at Honolulu to tour Hawaii under auspices of United Air Lines are a group of officials of eight scheduled U.S. carriers. They are, left to right, standing: W. W. Weesner, vice president-sales, Lake Central Airlines; Norman Arnold, general sales manager, Southern Airways; William C. McGee, passenger sales manager, Piedmont Airlines; George E. Shedd, manager of interagency and interline sales, Delta-C&S Airlines; Ralph Maugham, interline sales manager, American Airlines; R. L. Desmond superintendent of interline sales for UAL. Kneeling, left to right, are: J. M. Klapp, superintendent of government sales, UAL; M. Willston Offut, III, manager-interline relations, Capital Airlines; Harry Verderber, assistant to the director of agency and interline sales, TWA, and G. H. Macomber of United's western sales staff.

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Smith, Military Air Transport Service commander, that the Comet is an "uneconomic" airplane, and other remarks by Adm. DeWitt C. Ramsey, Aircraft Industries Assn. president, and Brig. Gen. Milton Arnold, Air Transport Assn. vice president, led to Hardingham's remark that–after listening to them–he supposed he should be convinced the British "should throw their Comets in the ashcan." But he assured the group this would not be done.

Hardingham cited experience on Comet jet engines showing the transport's turbines were more reliable than piston-type powerplants on other four-engine planes operated by British Overseas Airways Corp. He reported that engine overhauls have been extended to 450 hr. Gen. Arnold had stated that the jet engines were not yet as reliable as piston engines.

CAA Builds Traffic Control Test Center

A program to evaluate new air traffic control equipment under actual operating conditions at the CAA's Technical Development and Evaluation Center in Indianapolis has been announced by the Air Navigation Development Board.

Scheduled to begin operation in July, a new evaluation and control center now under construction will permit the first centralized tests of such new "common system" developments as air traffic data displays, data transfer and storage units, and remote radar displays.

▶ **New ARTC Established**–A recently established Air Route Traffic Control center, composed of traffic control sectors previously assigned to three other ARTC centers, will be housed in the same room as the evaluation center.

ARTC controllers will operate from the regular-control half of the new center until new equipment is ready for evaluation in the other half. Then one or more controllers can move to the evaluation side for trial under actual operating conditions without jeopardizing flight safety.

▶ **Bell Labs Participate**–Bell Telephone Labs and Western Electric engineers, under ANDB contract, will develop better integrated communication systems and improved controller consoles, with particular emphasis on the "human engineering" aspects of design. At its own expense, Bell will work on communication services capable of meeting future ARTC needs.

Industrial designer Henry Dreyfus, Ohio State University, and the USAF's Aero-Medical Lab also will participate in studies of the effects of noise, lighting, and work schedules on controller fatigue and operating efficiency.

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AIRLINE CAPTAIN, college education, fifteen years experience in all phases of civilian aviation, desires position as airport manager, executive pilot or flight school operator. PW-6355, Aviation Week.

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11	14601-1F-B1	Eclipse	Gyro Indicator
10	15401-1	Eclipse	Amplifier (PB10) w/ED3 MOUNT
66	10078-1AG	Eclipse	Gyro Indicator
62	CQ-9	Eclipse	Clutch Switch (PB10)
11	12086-1C	Eclipse	Amplifier
19	15100-1B-A1	Eclipse	Pitch Trim Gauge
8	20000-43A-13A1	Eclipse	Magnesyn Indicator
67	23000-2A	Eclipse	Magnesyn Indicator
15	22101-11-A4	Eclipse	Pressure Trans.
6	2226-11C-3A	Eclipse	Dual Tach.
9	20100-42B-14A2	Eclipse	Torque Ind.
9	20000-8A-14	Eclipse	Magnesyn Pos. Ind.
23	20100-11C-4-A1	Eclipse	Wing Flap Indicator
11	DW-33	Eclipse	Transformer
23	CQ-2	Eclipse	Switch Box
75	1195-4-A	Eclipse	Vibrator
80	DW-28	Eclipse	Transformer
11	2227-11-D3A	Eclipse	Tachometer
75	1416-12C	Eclipse	Starter
100	716-3A	Eclipse	Generator (NEA-3A)
384	564-2A	Eclipse	Oil Separator
71	828TY13Z2	Weston	Oil Temp. Indicator
26	827TY14Z2	Weston	Cyl. Head Temp. Indicator
40	119862	Weston	Carb. Air Temp. Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
1000	AN5780-2	G.E.	Wheel & Flap Position Indicator
40	828TY12Z2	Weston	Dual Carb. Temp. Gauge
11	727TY70Z2	Weston	Air Temp. Ind.
85	727TY72Z2	Weston	Air Temp. Gauge
88	727TY73Z2	Weston	Air Temp. Gauge
83	727TY74Z2	Weston	Air Temp. Gauge
10	728-40Z2	Weston	Air Temp. Gauge
21	8DJ29AAY	G.E.	Cowl Flap Ind.
22	77C5	Lewis	Carb. Air Temp.
16	76B19	Lewis	Cyl. Head Temp.
23	77C3	Lewis	Oil Temp. Gauge
13	77C4	Lewis	Oil Temp. Ind.
30	47B21	Lewis	Free Air Temp.
33	47B22	Lewis	Air Temp. Gauge
28	47B23	Lewis	Air Temp. Gauge
54	47B24	Lewis	Air Temp. Gauge
22	906-6-011	Kollsman	Diff. Press. Gauge
48	254BK-6-052	Kollsman	Diff. Press. Gauge
33	DW-47	Eclipse	Transformer
46	117-47	Edison	Fire Detector
19	117-10	Edison	Control Box
345	981280	Kidde	CO2 Cylinders
43	966090	Kidde	Interconnector
104	966679	Kidde	Pressure Control
225	981591	Kidde	Tee
151	A-4614	Kidde	Switch
47	M870036B	Kidde	CO2 Cyl.
74	92374B	Kidde	Oxygen Cyl.
326	982585	Kidde	Valve
325	AN6009-1B	Oh. Chem.	Valve
247	AN6009-2A	Oh. Chem.	Valve
47	2-1046-76	Parker	Valve (3000 PSI)
115	P4CA2A	Parker	Primer
98	SP4-2746-76	Parker	Restrictor Valve
68	SP4-2746-77	Parker	Restrictor Valve
105	SP4-2746-78	Parker	Restrictor Valve
68	6-746-10	Parker	Valve
40	SP4-2746-79	Parker	Restrictor Valve
48	SP4-2746-80	Parker	Restrictor Valve
60	SP4-2746-81	Parker	Restrictor Valve
127	PL2-2546-75	Parker	Cone Check Valve
123	PL2-2546-76	Parker	Cone Check Valve
620	PL2-2546-77	Parker	Cone Check Valve
540	PL2-2546-78	Parker	Cone Check Valve
142	SP4-2746-76	Parker	Restrictor Valve
112	PLY-843-54	Parker	Check Valve
23	PL2-1846-77	Parker	Check Valve
120	MF9-713-15A	Vickers	Hydraulic Pump
124	PF12-713-25BCE	Vickers	Hydraulic Pump
10	PF9-2713-20Z2	Vickers	Hydraulic Pump
327	PF4-713-20BCE	Vickers	Hydraulic Pump
57	MF45-3911-20Z	Vickers	Hydraulic Pump (3000 PSI)
28	AA31400	Vickers	Valve
125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
550	TFD8600	Thompson	Fuel Booster Pump
45	AN4103-2	Clifford	Brass (Valve #U4785) Oil Cooler
70	AN3213-1	Scintilla	Ignition Switch
250	A-9 (94-3226)	Nesco	Ignition Switch
66	M862A	Jos. Pollack	Master Switch
148	PG908AS1	Honeywell	Switch Air Ram.
40	PG908AS7	Honeywell	Air Ram Switch
18	4582-AA-6C	Dynamic Air Eng.	Blower
24	U-702-15	Joy Mfg. Co.	Blower
20	V301B7	Aerotec	Pressure Relief Valve
419	450	Skinner	Filter
287	1033-4E1	White-Rodgers	Heater Control Switch
126	17322-2	Fenwall	Thermo-Switch
34	9804B	Vapor Car Heating Co.	Control Box
25	46B311	Vapor Car Heating Co.	Compensator
202	A812	Interstate Aircraft & Eng. Co.	Solenoid
46	146102	Bendix	Valve (0-500 PSI)
240	1965-900	Airex	Relief Valve
29	HC2109	Air Associates	Hyd. Cylinder
8	HC2110	Air Associates	Hyd. Cylinder
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
90	JH950-R	Jack & Heinz	Starter Motor
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
230	921-B	Stewart-Warner	Heater (900000 BTU)
22	0655-D	Aro	Oxygen Regulator
65	ASDC2	CO2 Mfg. Co.	Fire Detector
97	6041H-146A	Cutler Hammer	Relay (B-12)
237	6141-H69A	Cutler Hammer	Circuit Breaker
47	7264-404	Leach	Relay
22	M-2031	Air Associates	Actuator
11	FYLD2516	Barber Colman	Thermostat
51	AYLZ2284	Barber Colman	Micropositioner
20	72400	Ham. Stand.	Prop. Reversing Control
10	5X18	Woodward	Governor
46	A14-A-9708P	Westinghouse	Contactor
26	70G3	G.E.	Transformer
718	B2A	Square D	Relay
6	83A94	Surface Combustion Co.	Heater
115	C6363-15A	Spencer	Circuit Breaker
115	C6363-1-2A	Spencer	Circuit Breaker
33	18784	Adel	Restrictor Valve
1700	AM1614-80	Heinemann	Circuit Breaker
31	30BX-2	Allied	Relay
85	12994-2	Adel	Lock Valve
805	58G926	G.E.	Ballast Core & Coil
140	58G946	G.E.	Ballast
40	7210-24	Leach	Relay
66	25432	Airesearch	Flex. Cable
518	MT48C	Bendix Radio	Insulator
90	M-101-B	Aerotec	Pressure Switch
12	M68EG	Bendix Radio	Mount
59	715E	Fulton Syphon	Temp. Control
478	D9530	Adel	Selector Valve
668	D9530-2	Adel	Selector Valve
428	D9560-2	Adel	Selector Valve
179	D9632	Adel	Selector Valve
237	D9696	Adel	Selector Valve
744	D10044	Adel	Selector Valve
244	D10051	Adel	Selector Valve
814	74947 (TY. PH3)	Aero Supply	Valve
335	AN5830-1	Whittaker	Valve
74	AN5830-6	Whittaker	Valve
60	AN5831-1	Parker	Valve
65	1011-2	Eclipse	De-icer Valve
130	612-4A	Eclipse	Valve
2200	37D6210 (AN4078-1)	United	Solenoid Valve
1888	K1593-6D	Kohler	Valve
500	NF3-5	Mallory	Noise Filter
20	TA-12B	Bendix Radio	Transmitter
35	RA10-DB	Bendix Radio	Receiver
2585	AN3096-4	Grimes	Dome Light
775	AN3096-5	Grimes	Dome Light
1365	AN3096-6	Grimes	Dome Light
6	610-2C	Eclipse	Vacuum Pump
550	PD12K10	Stromberg	Carburetor
236	PR48-A1	Stromberg	Carburetor
100	1685-HAR	Holley	Carburetor
19	1375F	Holley	Carburetor
407	SF9-LN-2	Scintilla	Magneto
185000	LS4-AD1	Aero	Spark Plug
1	R1820-52	Wright	Engine
16	R1820-54	Wright	Engine
4	R1820-60	Wright	Engine
1	R1830-43	P & W	Engine
166	1045A	P & W	Bearing
500	3506	P & W	Flange
130	8288	P & W	Follower Ass'y.
814	35814	P & W	Blower Ass'y.
53	48362	P & W	Shaft
75	48363	P & W	Shaft
56	48392	P & W	Sump
390	48461	P & W	Gear
78	76236	P & W	Gear
1178	84289	P & W	Bearing
113	84487	P & W	Housing
77	84591C	P & W	Nose Housing
200	84350-D	P & W	Crankcase Ass'y.
200	84083	P & W	Cylinder
100	84084	P & W	Cylinder
200	84085	P & W	Cylinder
281	CR2791-G100-K4	G.E.	Relay
626	CR2792F101-A3	G.E.	Relay
41	G34464	Guardian	Relay
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22	146102	Vickers	Brake Valve
9	557-5	Eclipse	Check Valve
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107	D12296	Adel	Pump
67	19100-2-101B	Kenyon	Check Valve
88	3135-11C	Eclipse	Pressure Switch
32	3V-217-HC	Pesco	Separator
100	27314	Purolator	Oil Filter
128	3801-3B	Eclipse	Fuel Quan. Gauge
33	420313	Wright Aero	Pump Assy.
46	416421	Wright Aero	Pump Assy.
76	U635A (-AN4000-2B)	U.A.P.	Fuel Strainer
12	U8416-MM	U.A.P.	Oil Cooler Assy.
25	26675	Airesearch	Motor
35	AA14002A	Vickers	Accumulator
21	FD65-5	Diehl	Motor
81	3616	Bendix Radio	Control
23	3620	Bendix Radio	Station Box
17	C-8 (B-2930-A)	Grimes	Cockpit Light
335	G1 (94-32376)	G.E.	Oxygen Pressure Signal Assy.
180	AW-CV-1-1	U. S. Gauge	Check Valve
740	1C-200	G.E.	Radio Noise Filter
15	1EAR-280BH	Pesco	Pump
7	SP-1-445-8	Parker	Selector Valve
8	1E691	Pesco	Pump
29	NEP-2	Eclipse	Auxiliary Power Unit
16	LER-30D	Lawrence	Auxiliary Power Unit
4	2CM46A2	G.E.	Generator
6	2P948EB	Pesco	Fuel Pump
21	2E258SA	Pesco	Pump
146	AW2-3/4-25K	U. S. Gauge	Manifold Press Gauge (Metric)
27363	CREB3N	Casco	Rod End
18	SA/3A	Kidde	Impact Switch
13	3GBD1A18A	G.E.	Regulator
18273	AN200-K3L2	Fafnir	Bearing
245	LMR-4	Micro	Switch
2094	PM-5	Spencer	Circuit Breaker
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31	5AM31JJ9A	G.E.	Amplidyne
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2000	8909-K99	C. H.	Switch
2747	NAF310310-4B	Cannon	Plug
402	NAF310310-5B	Cannon	Plug

STAINLESS STEEL BOLTS

Quan.	Part No.	Quan.	Part No.	Quan.	Part No.
200	AN3-CH3A	782	-C12	103	-C12A
440	-C4	637	-C13	114	-C25
411	-C6	121	-C14A	210	-C30
8211	-CH6A	7742	-C20	102	-C36
173	-C7	345	AN5-C7A	246	-C41
90	-C11	2543	-C7	165	AN6-C7
457	AN4-C4	1531	-CH7	393	-C14
516	-CH6	2578	-CH7A	129	-C14A
6714	-C7	1660	-C11	450	AN7-C21A
80	-C10A	185	-C11A	194	AN8-C15

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SHORTLINES

► **Air Transport Assn.** is making a study that may show first-class mail by air would both pay the Post Office and speed service over distances of more than 400 mi. . . . ATA also is preparing airline financial and pricing data for CAB's upcoming general fares investigation.

► **Air Line Pilots Assn.** asks CAB to reopen investigation of the Pan American World Airways' DC-4 crash off San Juan last April. CAB blamed Capt. John Burn's alleged "persistent action . . . in attempting to re-establish a climb, without using all available power . . ." ALPA says the facts do not bear this out, and Burn has "an enviable record as an airline pilot."

► **Avianca** plans weekly service between Bogota and Caracas with Air France as first step toward extending service to Europe with Air France.

► **Bonanza Air Lines** traffic in January, generally an off month, broke all records—4,976 passengers—compared with previous record of 4,830 last October. . . . Company volume gained 47% in 1952 to 43,296 passengers, partly due to a route extension from Phoenix to Los Angeles.

► **Braniff Airways** has issued its annual regional business, population and income analysis of "The Greater Braniff States of America." The analysis now includes the merged Mid-Continent Airlines, states, termed "the new six-state area annexed to the Braniff States of America."

► **British European Airways** predicts the new European coach services starting Apr. 1 will boost BEA annual traffic by 40% and revenues by 15%. BEA carried 1,336,000 persons in 1952 and this year will offer 90% of its capacity at coach rates.

► **British Overseas Airways** reports its jet Comets carried 15,000 passengers the first eight months in service, starting last May. . . . Company now has 231 fully trained jet air crewmen for its Comet fleet . . . BOAC reports that its passenger volume gained 13% last year.

► **Civil Aeronautics Board,** in a new "airfreight forwarder case," will seek a regulatory policy for all indirect carriers—forwarders, shippers' associations and shippers' cargo agents, "with suitable regulation to insure fullest development of each class."

► **Consolidated Flower Shipments, Inc.,** nonprofit association providing air transport service to San Francisco Bay area flower growers and shippers exclusively, is ordered by CAB to "cease and desist from engaging indirectly in air transportation. . . ." CAB says that regardless of its nonprofit, nonpublic character, the company is a common carrier within the meaning of the Civil Aeronautics Act, operating without letter of registration or other authority.

► **Consolidated Vultee** reports production and delivery of two more Convair 340s than the eight originally scheduled for January—one to Continental and one to Braniff. Scheduled deliveries: United 3, Braniff 1, Delta 2, Aero O/Y (Finnish Air Lines) 1, Pratt & Whitney 1. Convair also delivered its prototype to Phillips Petroleum.

► **National Airlines** has reduced New York-Norfolk fares $3.05 one way (to $20) and $5.80 roundtrip (to $38). . . . Company has started three daily nonstop New York-Miami DC-6 coach flights, plus two DC-6 night coach services. DC-6 conversion to coach was made possible by recent delivery of eight DC-6Bs. The DC-6 cuts one hour from the former five-hour run of the DC-4s. Price remains $44 plus tax. . . . Company switched New York operations to Idlewild Feb. 1 "in the interest of greater schedule dependability."

► **Port of New York Authority** has filed exhibits in the CAB reopened trans-Atlantic freight case, urging certification of an all-cargo airline. The Port Authority says present U. S. flag carriers have failed "to develop fully the bulk airfreight transportation market" overseas.

► **Pan American World Airways** reports completion of its 25,000 New York-San Juan flight since starting direct service July 1, 1946. The 885,000 passengers exceed combined total of Puerto Rico's 14 largest cities. Volume in 1952 showed an increase to 80 flights a week.

► **Piedmont Aviation** final mail pay is set by CAB to yield about $1,635,423 for the year starting Feb. 1; of this total, $1,567,423 is subsidy.

► **Trans World Airlines'** January domestic traffic gained 33% from a year ago to 164,662,082 passenger-miles. General sales manager C. S. Fullerton attributes the showing largely to increased coach schedules and coach popularity. . . . TWA-C&S interchange service Houston-New York via Pittsburgh starts Apr. 1.

WHO'S WHERE

(Continued from page 11)

elected to the board of directors of Bell Aircraft Corp., Buffalo, N. Y.

William B. Becker is the Air Transport Assn.'s new director of operations.

John W. Mazur, former engineering chief at the Naval Air Test Center, Patuxent, Md., has joined Doman Helicopter, Danbury, Conn., as chief design engineer.

Thomas M. Mountjoy has been appointed director of the recently formed aircraft products sales department, Engineering and Research Corp., Riverdale, Md. Other appointments: **William H. Dobbins,** assistant treasurer, and **Jerome L. Maxwell,** engineering assistant to the contract administrator.

Randolph M. Lee has been named assistant director of the Hawaii Aeronautics Commission.

Robert P. Sherwood has been appointed assistant to the vice president-operations for Mohawk Airlines, Ithaca, N. Y. Also promoted are **F. A. Butterfield,** to superintendent of maintenance, and **Walter J. Ferrari,** to chief dispatcher.

W. N. (Buck) Hall has been named superintendent at Temco Aircraft Corp., Dallas, Tex. **Herman Muller** is new superintendent of night production.

Col. Paul H. Kemmer, USAF (Ret.), has joined Owens-Corning Fiberglas Corp., Toledo, O., as an aeronautical consultant.

Joseph Poitras has been appointed chief of the new Products' Design & Development Division, Astron Corp., Newark, N. J.

Leonard J. Povey has resigned from Fairchild Engine and Airplane Corp. to fly charter service Ft. Lauderdale, Fla.-Bimini, Bahamas.

George F. Schroeder has been named acting assistant chief engineer for airborne equipment of Ford Instrument Co., Long Island City, N. Y.

Don Wiley has resigned from federal government service to rejoin Pan American Airways as public relations representative of the carrier's Pacific-Alaska Division, San Francisco.

John E. Canaday has been promoted to corporate director of public relations for Lockheed Aircraft Corp., Burbank, Calif., and **Don H. Cameron** has been appointed director of industrial relations.

Kent M. Campbell has been promoted to assistant manager of the San Diego Contracts Division Solar Aircraft Co. **William F. Cords** is new head of aircraft and engine contracts.

Carlyle H. Jones has been named director of advertising and public information of Sperry Gyroscope Co., Great Neck, N. Y.

Pierre Arozarena is new manager of the Air France midwestern district, Chicago.

Honors and Elections

Joseph D. Ryle, public relation director of American Airlines, has been elected chairman of the public relations advisory committee, Air Transport Assn.

Dr. John V. N. Granger, Stanford Research Institute, has been named the "outstanding young electrical engineer of 1952" by Eta Kappa Nu Assn.

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Frankly, working at North American requires hard thinking and plenty of vision. Because North American always works in the future. Yet, if you are interested in advanced thinking, if you'd like to work on the planes that will make tomorrow's aviation history, you'll like working at North American. North American offers these extra benefits, too.

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Salaries commensurate with ability and experience • Paid vacations • A growing organization • Complete employee service program • Cost of living bonuses • Six paid holidays a year • Finest facilities and equipment • Excellent opportunities for advancement • Group insurance including family plan • Paid sick leave • Transportation and moving allowances • Educational refund program • Low-cost group health (including family) and accident and life insurance • A company 24 years young.

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EDITORIAL

4 Final Edition

The Detroit News

Part One

2 DIE IN JET AT AIR SHOW

5 Spectators Injured as Plane Falls Apart

Labor Unites for Holiday

Songs, Rodeo at State Fair

Eisenhower Gains Support in 6 Middle Atlantic States

65,000 See Polar Plane

Behind Page One

Howler Near Flee Coast

Planning a Safe & Sane Air Show

We congratulate the management of the sixth annual aviation exposition to be held next July in Detroit. Neither that city, nor aviation, wants more publicity like last year's example shown above. They have sensibly ruled that the following will be excluded from the program:

1. All types of air racing.
2. Highspeed passes.
3. Close-formation flying.
4. Aerobatic flying, whether civil or military.

Instead of inflicting such risk on flying personnel and spectators on the ground, the program will stress such constructive attractions as:

1. Ground exhibits of both civil and military aircraft.

2. Ground exhibits of accessories and components.

3. Controlled-flight demonstrations, emphasizing utility and safety.

4. The departure and arrival of significant civil and military long-distance flights.

5. Tie-in with appropriate aviation television programs, local and national.

Such a constructive program will set the best possible theme for this year's exposition, "What Aviation Does for You—Citizen, USA," during the 50th anniversary of the Wright brothers' first flight.

The executive committee has made a courageous decision that should set a new mark in safe-and-sane air shows, and in the right kind of publicity for aviation. Jack Reese is chairman. James Votta is managing director. Lawrence Zygmunt is chief of operations, and E. T. Peabody is deputy chief of operations. They and their backers and associates deserve the plaudits of an industry that is trying conscientiously, constantly, to meet the needs of the public for safe transportation.

Unnecessary stunts and risks to life and limb belong to another age, gone forever.

Less Secrecy About Korea

A significant public statement made a few days ago by the commanding general of the U.S. Far East Air Force deserves more attention than it has received generally.

Gen. O. P. Weyland told the press that our Air Force estimates the Reds' combat air strength at 7,000 planes in the Far East.

He says the Soviet Union alone has 4,500 available combat planes, while the Chinese Reds hold another 2,500.

This estimate is several times larger than earlier official reports that had been made public.

Thus, after months of rumors, Gen. Weyland confirms a stream of private reports that have been brought back from Japan and Korea by returning military people, newspaper men, and other visitors.

Some of these visitors have placed the total Red strength at more than 7,000 planes.

These returning citizens were not dreaming up their own estimates. They were bringing back facts from authoritative sources which could not be attributed officially and released through Air Force information channels because of "security."

Just what breach of U.S. security was involved in telling the Reds how many aircraft they had is a moot question, but the fact remains that there have been instances—such as the Red air buildup—when the Air Force has been blocked by high government officials, for political reasons, from telling important facts about the air war.

Some interference on lower levels has come from questionable judgment of some Air Force officers in determining information that can be released. And "security" frequently disappears as a barrier to news when inter-service rivalry rears its head in a search for publicity and headlines.

The Truman Administration never faced up to its public responsibility by telling us the size of the air forces our own men and our Allies faced.

The Reds, with their intelligence service and their constant aerial surveillance of our entire holding area, have known more about some important phases of this war than most U.S. citizens. Why?

It is to be hoped that Gen. Weyland's announcement is an indication that the Eisenhower regime intends to tell the public more of the facts we deserve to know.

—Robert H. Wood

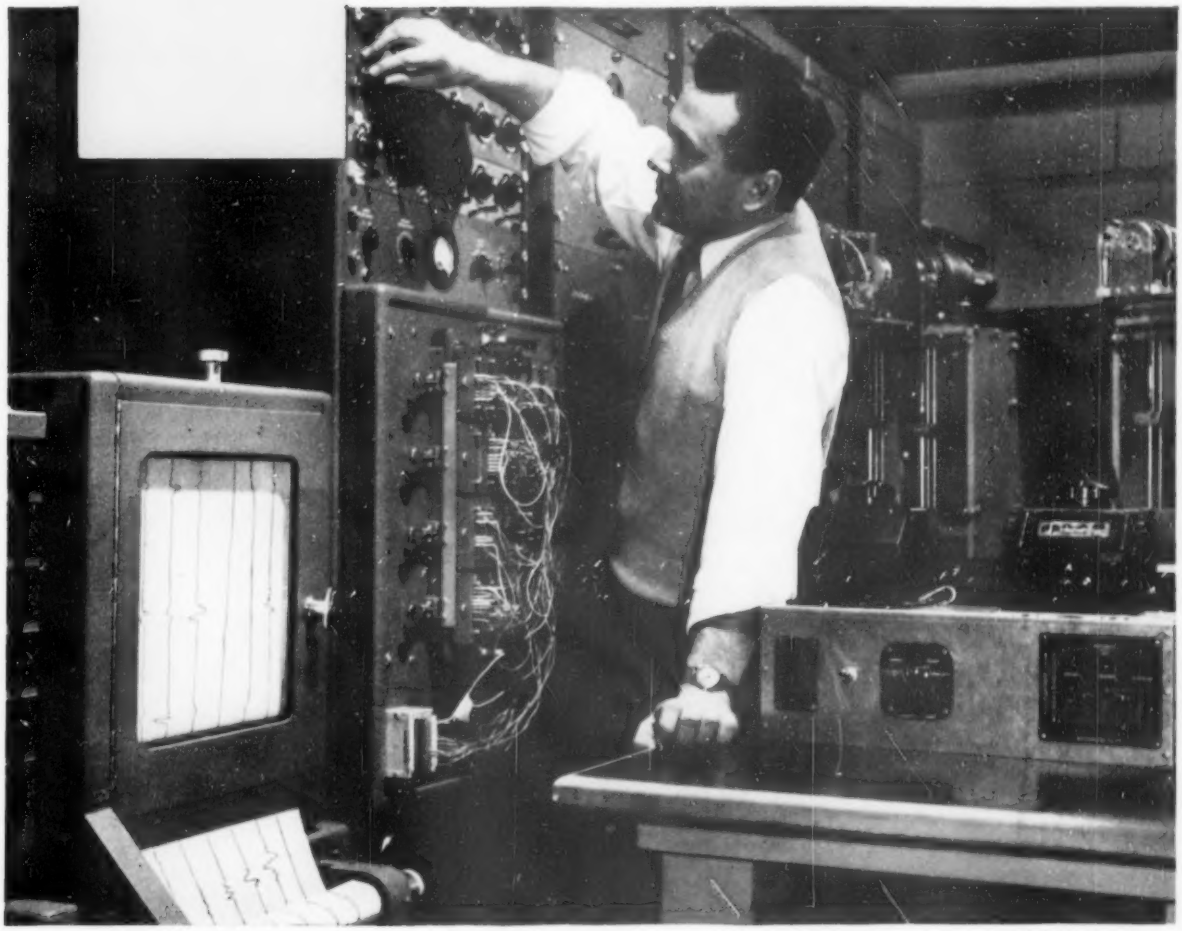
Flying Tomorrow's Jets

Sperry research engineers are seeking solutions for tomorrow's flight control problems while they develop new ways to better the performance of control equipment currently flying.

This analog computer is duplicating flight conditions of a new high-performance jet bomber being "flown" automatically by the Gyropilot* flight control. Here, for instance, a Sperry engineer checks the performance of the airplane and automatic pilot during the bombing run.

In test after test – in laboratory and its great Flight Research Center, MacArthur Field, Long Island–Sperry flight controls are continuing to prove their capacity to maintain stable all-weather flight in jet, propeller-driven, rotary-wing, lighter-than-air and pilotless aircraft.

For 40 years Sperry has been working continually on flight control problems. With this wealth of experience to build on, tomorrow's problems are being met by today's research and engineering.



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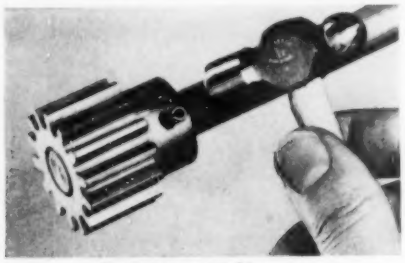
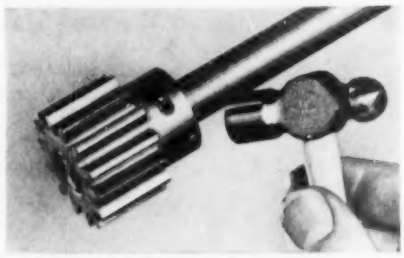


It compresses as driven.



Rollpin fits flush . . . is vibration-proof.

Rollpin is the slotted tubular steel pin with chamfered ends that is cutting production and maintenance costs in every class of industry.

This modern fastener drives easily into standard holes, compressing as driven. Its spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. Rollpin is readily removable and can be re-used in the same hole.

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If you use locating dowels, hinge pins, rivets, set screws—or straight, knurled, tapered or cotter type pins—Rollpin can cut your costs. Mail our coupon for design information.

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☐ Here is a drawing of our product. What fastener would you suggest?

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